IBM

Enhanced 5250 Emulation Program

User's Guide

Office Systems Family

Fourth Edition (October 1989)

Summary of Changes

The following functions have been changed or added to the Emulation Program:

- Most of the memory used will be released upon termination of the Emulation Program.

- The program is invoked by a single command (DP5250).

- The configuration program has been updated to support additional emulation modes.

    Note: As a result of this change, all users of version 2.2 must reconfigure the Emulation Program.

Support has been added for the following:

- 3196 Display Emulation

- 5224/5225 Printer Emulation

- Printer Function Table.

Support has been discontinued for the following features and devices:

- IBM System/34

- NEC 3550 Spinwriter[1]

- File Support Utility

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[1] NEC and Spinwriter are registered trademarks of the NEC Corporation.

Preface

This manual explains how to use the IBM PS/2® and the IBM personal computer[2] with the Enhanced 5250 Emulation Program, Version 2.2 (Emulation Program) when attached to a host[3] that supports the 5250 Information Display System.

Note: For information on 5250 Emulation compatibility with nonreferenced IBM PS/2 or IBM personal computers contact your IBM Marketing Representative, your IBM Authorized Advanced Product Dealer, or your IBM Authorized Industry Remarketer.

Before using the Emulation Program, you should have some knowledge of your PS/2 or personal computer, IBM Disk Operating System (DOS), the IBM 5250 Information Display System, and your host system. This manual will not teach you how to use the host functions.

The IBM Disk Operating System, Version 2.1, 3.3, or later, is required for the IBM Personal Computer, the IBM Portable Personal Computer, and the IBM Personal Computer XT™ .

DOS Version 3.1 or later is required for the IBM Personal Computer AT®.

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[2] IBM personal computer (pc) refers to any or all of the following: the IBM Personal Computer, the IBM Portable Personal Computer, the IBM Personal Computer XT, the IBM Personal Computer XT 286, and the IBM Personal Computer AT.

[3] Host refers to the IBM Application System/400™, the IBM System/36, or the IBM System/38. The IBM Application System/400 is a trademark of the International Business Machines Corporation.

PS/2 is a registered trademark of the International Business Machines Corporation. IBM PS/2 refers to the PS/2 models 25, 30 and 30 286, and the Personal Typing System.

Personal Computer XT is a trademark of the International Business Machines Corporation.

Personal Computer AT is a registered trademark of the International Business Machines Corporation.

DOS Version 3.2 or later is required for the IBM Personal Computer XT 286.

DOS Version 3.3 or later is required for the IBM PS/2 (models 25, 30, 30 286) and the IBM Personal Typing System.

The Emulation Program enables you to emulate (imitate the functions of) a subset of the IBM 5250 display stations and printers and to use the functions of your host. The program allows you to emulate either the IBM 3196, or IBM 5292 Model 2 Display Station, and the IBM 5219, 5224, 5225, and 5256 Printer functions. Graphics functions and a plotter are supported. The Enhanced Display Station Emulation Adapter and this program allow the PS/2 or personal computer to perform the function of two work stations at the same time on one twinaxial cable.

If you are using the graphics support functions, the following limitations are imposed in addition to the limitations imposed by the basic emulation program functions.

- The same Asynchronous Communications Adapter may not be used in a Disk Operating System (DOS) session while the graphics functions are being used to plot a chart in another session.

- The Asynchronous Communications Adapter cannot be used to support the plotter at the same time as the Synchronous Data Link Control Adapter or Binary Synchronous Communications Adapter is being used.

- The printer cannot be used to support the graphics feature. Graphics orders are responded to as though a printer is not attached.

- Interrupt vector hex 59 is reserved for Virtual Device Interface (VDI) routines.

The program files are contained on four 5.25 inch and two 3.5 inch diskettes.

A file labeled READ-ME.TXT, located on Program Diskette 1, contains supplemental information. Please display this file and read its contents. You can display the file by loading DOS, if

necessary, inserting the diskette into drive A, changing drives to the A: drive, and entering:

TYPE READ-ME.TXT

If the screen fills up with data, you may stop the displaying of data by pressing CTRL and then NUM LOCK. To continue, press ENTER.

Terminology

The following terminology will be used through this manual:

Term	Meaning
Emulation Program	Enhanced 5250 Emulation Program, Version 2.2
Adapter	Enhanced Display Station Emulation Adapter
PS/2	Personal System/2 (models 25, 30, 30 286) and the Personal Typing System
personal computer	IBM Personal Computer, IBM Portable Personal Computer, IBM Personal Computer XT, IBM Personal Computer XT 286, IBM Personal Computer AT
host	IBM System/36, IBM System/38, IBM AS/400
system unit	PS/2 or personal computer
cable	Integrated Cable Assembly
Technical Reference Manual	Enhanced 5250 Emulation Program Version 2.2 Technical Reference manual

All references to the IBM 5224 Printer are also valid for the IBM 5225 Printer.

Organization of This Manual

Chapters 1 and 2 are for the person responsible for planning and installing your system unit.

Chapter 2 and the Technical Reference manual are for the person responsible for preparing the disk(ettes) and the Emulation Program for use.

Chapters 3 through 10, the appendixes, and the Glossary are for the person who will be using the PS/2 or personal computer to emulate display stations and printers after their system unit is connected to a host.

Below is a summary of each chapter and appendix:

- Chapter 1, Getting Ready for 5250 Emulation, gives information for the planning necessary to attach the system unit to a host.

- Chapter 2, Preparing the Emulation Program, gives information necessary to configure the Emulation Program and do the other tasks needed before an operator begins.

- Chapter 3, Operating the Emulation Program, describes how to load the Emulation Program onto your system unit and how to use the functions of the program.

- Chapter 4, Using the Display Screens, describes the emulation display.

- Chapter 5, Using the Keyboard, describes how the system unit keyboards emulate the IBM 5250 keyboards.

- Chapter 6, Emulating an IBM 5219 Printer, describes the emulated control panel for the IBM 5219 and shows how the IBM 5219 Printer is emulated on the system unit attached printers.

- Chapter 7, Emulating an IBM 5224 Printer, describes the emulated control panels for the IBM 5224 and shows how the IBM 5224 Printer is emulated on the system unit attached printers.

- Chapter 8, Emulating an IBM 5256 Printer, describes the emulated control panels for the IBM 5256 and shows how the IBM 5256 Printer is emulated on the system unit printers.

- Chapter 9, Plotting Graphics, describes the operator action not described in the plotter operator's manual that is required to operate the following plotters when they are attached to the system unit:

  - IBM 7371
  - IBM 7372
  - IBM 6180.

- Chapter 10, Advanced Configuration, explains the advanced configuration options.

- Appendix A, Handling Error Codes and Messages, lists error messages with their accompanying causes and recoveries.

- Appendix B, Handling Problem Determination, describes how to diagnose and correct problems that might occur during installation and operation.

- Appendix C, Updating the Emulation Program, explains how to apply and list updates to the Emulation Program.

- Glossary.

- Index.

You should have some knowledge of how to use your system unit, including IBM DOS. Therefore, it is important that you read and understand the following manuals:

- IBM PS/2 *Guide to Operations*

- IBM Personal Computer *Guide to Operations*

- IBM *Disk Operating System*.

The person responsible for installing your system unit should read:

- IBM Enhanced Display Station Emulation Adapter *Guide to Operations*, which is included with the emulation hardware

- Enhanced 5250 Emulation Program *Technical Reference*, which is included with the Enhanced 5250 Emulation Program, Version 2.2

- this user's guide.

The person responsible for running the more technical portion of the configuration program or modifying the host or local programs should become familiar with the Technical Reference manual.

Related Books

This is a list of publications that are referred to in this manual.

- IBM 5250 Information Display System *Planning and Site Preparation Guide*, GA21-9337

- IBM 5250 Information Display System *Functions Reference Manual*, SA21-9247

- IBM 3196 Display Station *User's Guide*, GA18-2482

- IBM 5292 Color Display Station Models 1 and 2 *Operator's Guide*, GA21-9416

- IBM 5219 Printer Model D01/D02 *Setup Procedures/Operator's Guide*, GA23-1019

- IBM 5224 Printer *Operator's Guide*, GA34-0095

- IBM 5225 Printer *Operator's Guide*, GA34-0054

- IBM 5256 Printer *Operator's Guide*, GA21-9260

- IBM 5294 Control Unit *Operator's Guide and Operating Procedures*, GA21-9370

- IBM 5394 Remote Control Unit *Operator's Guide and Problem Determination Procedures*, GA27-3805

The coordinator for your IBM host system should also be able to supply a list of books for the host system. You should refer to this list for any additional books you may require.

Data Security

To minimize the potential data security risk, you should do the following:

* **If you write your own application program, it should be written to require each user to sign on with a security password before the host system will re-establish a session.**

* **If you use an application program that does not require a security password before re-establishing a session, you should always have the system operator do the following:**

  * Cancel the job if either the system unit or host system failure occurs during the session and the session is lost.
  * Cancel any spool writer job for a printer session, when applicable.

The Emulation Program and Adapter, in conjunction with the system unit, is a powerful and useful tool to help you with your personal and business information processing needs. As with any information system, inadvertent errors may occur and information may be misused. We suggest that when processing sensitive or highly valuable information, you take steps to ensure that your data and programs are protected from accidental or unauthorized disclosure, modification, destruction, or misuse. Simple measures, such as removing diskettes when not in use, keeping backup copies of valuable information, or installing the equipment in a secure facility, can go a long way to maintain the integrity and privacy of your information.

Technical Assistance

Technical assistance questions should be directed to your IBM Marketing Representative, IBM Authorized Advanced Products Dealer, or IBM Authorized Industry Remarketer.

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Chapter 1. Getting Ready for 5250 Emulation

The Emulation Program enables the PS/2 and personal computer to emulate 5250 display stations, printers, and a plotter. The Adapter and this program allow the system unit to perform the functions of one or two work stations at the same time on one twinaxial cable. The work station(s) may be defined as one display, two displays, or one display and one printer. Either display session may be configured to provide graphics and plotter support. Only a single graphics session is allowed.

The operator interacts with the work stations and each work station is addressed as a session. A Hot Key sequence allows the operator to change sessions. Each time a Hot Key sequence is entered, the session changes to the next session. The host sessions remain online while the system unit is in PS/2 or personal computer mode.

Each display session or printer session uses a unique work station address to the attached host.

Introduction

This chapter is designed for the person who does the planning for your host system and the attachment of the PS/2 or personal computer to the host system. Other parts of the manual provide information for the person who prepares the Emulation Program and for the operator.

Warning: Do not attempt to attach your PS/2 or personal computer to a host system without proper authorization and instructions.

Requirements for Host Computers

The minimum requirements for the host system include appropriate cables and connectors. See "Arranging the Work Stations" on page 1-9 for more information concerning the connection of work stations.

The host computer may be one of the following:

- IBM System/36 (one of the following);

    5360 System Unit

    5362 System Unit

    5363 System Unit

    5364 System Unit

- IBM System/38 (one of the following):

    5381 System Unit

    5382 System Unit

- IBM AS/400

    9404 System Unit

    9406 System Unit.

The system unit may also be connected to a host computer through one of the following remote work station controllers:

- IBM 5294 Remote Work Station Controller

- IBM 5394 Remote Work Station Controller

The following additional software products may be required:

- A graphics support package such as the IBM System/36 Business Graphics Utilities (Program 5799-BNW) (if graphics are being used).

- If the IBM System/36 (5360 System Unit or 5362 System Unit) is used, Release 5 Modification Level 1 or later of the System Support Program (5727-SS1) must be used.

- If the IBM System/36 (5364 System Unit) is used, Release 5 Modification Level 1 or later of the System Support Program (5727-SS6) must be used.

- If the IBM System/38 is used, Release 8 or later of the Control Program Facility (5714-SS1) with Program Change 'C' (PC'C') must be used.

- If the IBM AS/400 is used, Release 1 or later of the Operating System/400 Program (5728-SS1) must be used.

Requirements for System Units

The minimum requirements for your system unit are:

- One of the following display subsystems:
  - IBM 5151 Monochrome Display and one IBM Monochrome Display and Printer Adapter or one IBM Enhanced Graphics Adapter (EGA). (See Notes 1 on page 1-4 and 2 on page 1-4.)
  - IBM 5153 Color Graphics Monitor and one IBM Color Graphics Adapter (CGA) or Enhanced Graphics Adapter (EGA). (See Note 2 on page 1-4.)
  - IBM Enhanced Graphics Monitor, 5154 Model 1, with the IBM Enhanced Graphics Adapter. (See Note 2 on page 1-4.)
  - IBM 5175 Professional Graphics Monitor with Professional Graphics Controller. (See Note 3 on page 1-4.)
  - IBM 8503 PS/2 Monochrome Display.
  - IBM 8507 PS/2 Monochrome Display.
  - IBM 8512 PS/2 Color Display.
  - IBM 8513 PS/2 Color Display.
  - IBM 8514 PS/2 Color Display.
  - Monitor that can support 25 x 80 character screens, with the appropriate adapter.

Notes:

1. The EGA is required to support graphics on the Monochrome Display.

2. The addition of the IBM Graphics Memory Expansion Card with the Enhanced Graphics Adapter provides full 16 color support. The EGA card has 64K of memory and provides 4 colors; with the Memory Expansion card it has 128K of memory and provides 16 colors. The use of the Graphics Memory Module Kit does not provide additional functions.

3. The Professional Graphics Controller requires two adjacent expansion slots in either the system unit or the expansion unit of the IBM Personal Computer XT or the IBM Personal Computer AT. The two adjacent slots must be in the expansion unit of the IBM Portable Personal Computer or the IBM Personal Computer.

- One 5.25 inch Dual-Sided Diskette Drive and Diskette Drive Adapter or one 3.5 inch Diskette Drive and Diskette Drive Adapter (if required).

- If a printer session is to be used, one of the following is required:
  - IBM 5152-1 Matrix Printer
  - IBM 5152-2 Graphics Printer
  - IBM 5216 Wheelprinter

    Note: The 5216 printer requires a Parallel or Serial attachment interface to be installed on the printer before connecting it to the system unit.

  - IBM 5182 Color Printer
  - IBM 4201 Proprinter™
  - IBM 4202 Proprinter XL
  - IBM 4207 Proprinter X24
  - IBM 4208 Proprinter XL24

Proprinter is a trademark of the International Business Machines Corporation.

- IBM 5201 Quietwriter®
- IBM 5202 Quietwriter III
- IBM 5204 Quickwriter®
- IBM 3812 Pageprinter
- HP LaserJet Series II printer
- User-defined printer

   Note: Refer to the Technical Reference manual for additional information about user-defined printers.

- One IBM Enhanced Display Station Emulation Adapter

   Note: For each PS/2 or personal computer that is connected to the host using twinaxial cables, you must order an IBM Enhanced Display Station Emulation Adapter.

- IBM Disk Operating System (DOS)

- If graphics support is used, one of the following plotters may be used during a graphics session:

   - IBM 7371 Plotter (two pen)
   - IBM 7372 Plotter (six pen)
   - IBM 6180 Plotter (eight pen)

   Notes:

   1. A plotter requires the use of an Asynchronous Communications Feature.

   2. A plotter cannot be supported when an Asynchronous Communications Adapter and a Synchronous Data Link Control Adapter or Binary Synchronous Communications Adapter are being used at the same time.

   3. A plotter cannot be supported if a serial printer is being used for printer emulation.

   4. The Enhanced Graphics Adapter (EGA card) may operate for up to 17 msec with interrupts off. This can

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cause overruns and data loss in SDLC and BISYNC communications operating above a certain baud rate. Other DOS applications and system unit hardware may also be affected.

- Memory requirements:

  A minimum of 128K of memory is needed to load the Enhanced 5250 Emulation Program. A minimum of 102K of memory is needed (in addition to the 128K) to support graphics emulation. The configuration program requires at least 128K of memory (256K for graphics configuration) to operate. The configuration program does not need to be run on a system unit with the Adapter.

  - Emulation requires 40K of memory when one or two display stations are configured.

  - Emulation requires 76K of memory when both display and printer stations are configured.

  - Graphics feature programming requires 80K of memory to operate. (See Note 3.)

  - Memory requirements for DOS vary with the version used and are in addition to any other PS/2 or personal computer memory requirements. (See Note 4.)

Notes:

1. If the IBM Color Graphics Adapter, Enhanced Graphics Adapter, or Professional Graphics Adapter is used with this program, an additional 12K of memory is required.

2. Additional memory is required to support user-defined printers.

3. Memory requirements for graphics support does not include memory for the VDI buffer space.

4. Refer to the appropriate manuals for the memory requirements of the version of DOS and the application programs you plan to use.

The Enhanced 5250 Emulation Program package includes this User's Guide and the following items:

- 5250 Emulation Program with Graphics Support Licensed Program Diskettes

- IBM Enhanced 5250 Emulation Program, Version 2.2 Keyboard Templates, G570-2226.

- IBM Enhanced 5250 Emulation Program, Version 2.2 *Technical Reference*, G570-2222.

- IBM Enhanced 5250 Emulation Program, Version 2.2 *License Information*

The Enhanced 5250 Emulation Hardware offering includes the following items:

- IBM Enhanced Display Station Emulation Adapter *Guide to Operations*, G570-2223

- IBM Enhanced Display Station Emulation Adapter *Hardware Maintenance and Service*, G570-2224

- IBM Enhanced Display Station Emulation Adapter *Technical Reference*, G570-2225

- IBM Enhanced Display Station Emulation Adapter

- IBM Enhanced Display Station Emulation Adapter Diagnostic Diskettes

- Integrated Cable Assembly

Note: A default address setting of hexadecimal 271A through 271F is used. If you have another adapter card on the system unit which uses these addresses, refer to "Setting the Adapter I/O Address Switches" in this chapter.

Planning for the Installation

The attachment of your PS/2 or personal computer to a host requires careful planning. This planning includes decisions about how and where your system unit is to be connected. The person in your organization who is responsible for the physical planning of the host should also be involved in the planning for the installation of your system unit, Adapter, and the Emulation Program.

Considerations for Attaching to a Host System

Here are some of the rules you must follow when attaching your system unit to a host. For more information, see Chapter 2, "Preparing the Emulation Program" on page 2-1.

- A maximum of seven work stations can be connected in series on a local work station line.

- A maximum of eight work stations or system units can be connected to an IBM 5294 Controller.

- A maximum of 16 work stations or system units can be connected to an IBM 5394 Controller.

    Note: Each system unit must have a work station address for each session that it uses. Each address used by a display session or a printer session is counted as one of the maximum number of work station allowed on a work station line.

- When attaching a work station to the work station line, the minimum distance between two Integrated Cable Assemblies is 1 meter (3.3 feet).

- Any work station line can have a maximum of 11 junctions. Each display, printer, PS/2, personal computer, cable splice, or station protector is a junction.

- If the last work station on a line (other than a PS/2 or personal computer) does not have the Cable Thru feature, it must remain the last work station on that line.

- The maximum cabling distance between the host and the last work station or system unit on the twinaxial cable is 1525 meters (5000 feet).

Configuring the Host for the Emulation Program

When you configure the host for the Emulation Program, enter the following device codes:

Figure 1-1. Device Codes	
Type of Emulation	**Device Code**
Display	PC emulating 3196
Graphics	5292-2
Printer	Any combination of 5219, 5224, 5225, or 5256

Arranging the Work Stations

The device arrangement that meets your needs can be determined by looking at a cabling diagram for your host. Figure 1-2 on page 1-10 shows the lines (twinaxial cables) that connect the devices (displays, printers, and system units) to a host via local attachment. Figure 1-3 on page 1-11 shows the lines that connect the devices to a 5294. The remote work station connects to the host via a communications link. Refer to the appropriate host installation or device configuration manuals for information on device arrangement and assigning addresses on your host.

Note: Each system unit must have a work station address for each session that it uses. Each address used by a display session(s) or a printer session is counted as one of the seven work stations allowed on a local work station line.

The D-connector on one end of the Integrated Cable Assembly connects to the Adapter (at the back of the system unit).

Note: There are two cable models:

- An older model which has two connectors labeled **1** and **2** (connector 1 is self terminating).

• A newer model which has two unlabeled connectors (both are self-terminating).

The work station line from the host connects to a port on the junction box (labeled 1 for the older cable model; either port for the newer model), which is mounted on the other end of the cable assembly. When no line is connected to the other port (labeled 2 for the older cable model), the line is automatically terminated. If another line is connected to port 2 (or second port for the newer cable model), the line must be terminated at the next work station. The cable assembly allows you to disconnect a work station from the end of the line without disrupting other work stations. For more information about parts, refer to the Enhanced Display Station Emulation Adapter *Guide to Operations*.
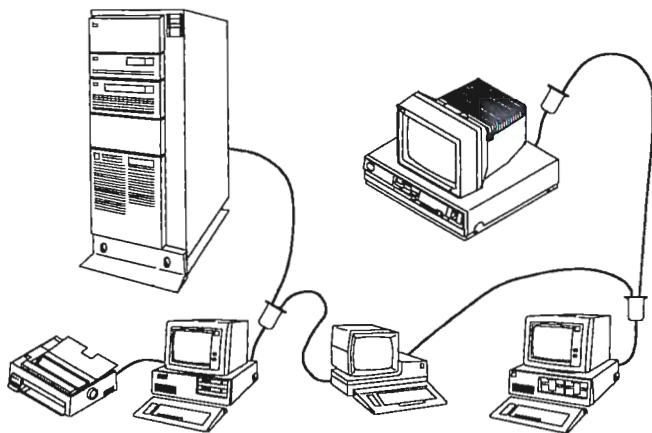
Figure 1-2. Local Attachment of Work Stations

Note: Cable adapters may be required if you cut and splice the twinaxial cable. Refer to the appropriate host installation or device configuration manuals for further information.
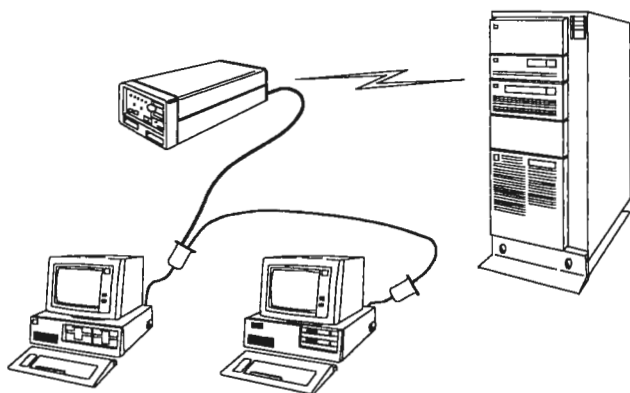
Figure   1-3. Remote Attachment of Work Stations

Setting the Adapter I/O Address Switches

The I/O address switches are set at the correct settings when you receive the Adapter from the factory. You may verify the settings by following the directions in the Enhanced Display Station Emulation Adapter *Guide to Operations* manual.

Note: This address is also required in the profile. See "Understanding the Work Station Profile" on page 1-13. If the adapter switches are changed on the card, it will be necessary to run the configuration program.

Planning for Implementation

Considerations for Using the Disk Operating System

The Emulation Program can run under the Disk Operating System (DOS), Version 2.1, 3.1, or later. IBM Personal Computer AT users require DOS Version 3.1 or later. IBM Personal Computer XT 286 users require DOS Version 3.2 or later.

The IBM PS/2 Models 25, 30, 30 286, and the Personal Typing System require DOS, Version 3.3 or later.

The following system units allow access to files on the fixed disk while the Emulation Program is running.

- IBM PC XT models 086 and 087 with a fixed disk

- IBM PC Expansion Unit with a fixed disk

- IBM PC AT

- IBM PS/2 models 25, 30, and 30 286

- Personal Typing System

You cannot operate another adapter (other than the fixed disk adapter) that uses interrupt level 5 at the same time the Emulation Program is in use.

Notes:

1. The Emulation Program should only be used with the IBM DOS. Any use of the system unit without DOS, any modification to the IBM DOS by the user, or any DOS extension software may cause unpredictable results.

2. The memory requirements for your system unit must be considered to ensure that your Emulation Program and any application programs can be run at the same time. See "Requirements for System Units" on page 1-3 for memory requirements.

3. To process graphics data in a host graphics session, the GR5250.COM program must be running in the DOS session. Refer to Chapter 3, "Operating the Emulation Program," "Introduction" on page 3-1 for use of the GR5250.COM program.

Considerations for Using the DOS 4.0 Shell Option

If you are using the DOS 4.0 Shell option, the following guidelines should be followed for emulation:

- The Emulation Program can be accessed successfully from the Shell only when the Shell is operating in text mode. However, starting the Emulation Program from the DOS 4.0 Shell results in an inefficient use of memory. It is recom-

mended that the Emulation Program be started before starting the Shell.

- The Emulation Program and the DOS Shell must be terminated in the reverse order in which they were started. Otherwise unpredictable results will occur.

- When using an IBM PS/2 Mouse attached to an IBM PS/2 Model 30 286, the mouse must be attached prior to turning on the system unit. The DOSSHELL.BAT file must include the driver PCIBMDRV.MOS. The mouse program (MOUSE.COM) must be executed before loading the Emulation Program. This should be taken into consideration when setting up your AUTOEXEC.BAT file.

- The driver PCIBMDRV.MOS must be removed from the DOSSHELL.BAT file if an IBM PS/2 Mouse is not attached to the IBM PS/2 Model 30 286.

Considering Program Applications

The Emulation Program works with most PS/2 and personal computer programs. However, some programs, such as a one that overlays the Emulation Program, are not compatible.

Some programs must operate within 64K boundaries. If a program does not fit within a 64K block of memory and if your system unit has more than 64K of memory, the entire program can be loaded in the next 64K block of memory. In this case, some memory below the 64K boundary may not be usable.

Understanding the Work Station Profile

A program (CONFIG.EXE) to build the work station profile is provided on the Emulation Program diskette. The work station profile contains the parameters necessary for your system unit to communicate with the host and to operate the Emulation Program. These include:

- Display station emulation parameters

- Work station session parameters

- System unit hardware parameters

- Printer parameters.

The configuration program provides menus that help the operator make selections.

Note: The Emulation Program defaults to one display session at address 0 with a 5250 style keyboard if you do not customize your own profile.

Before you execute the configuration program, the host system planner should provide you with a list of 1 to 7 work station addresses for each device (displays and printer). They must be entered during execution of the configuration program.

Note: When upgrading from Enhanced 5250 Emulation Program, Version 2.12, you must execute the configuration program prior to starting the Emulation Program. See "Configuring 2.12 Emulation Profiles to 2.2 Level" on page 2-19.

Profiles are provided for the keyboard definitions assigned to the system units. The users may choose to use one of these keyboard definitions or to customize their own. Refer to the Technical Reference manual for assistance in assigning your own character and function keys. The various keyboard definitions are also identified there.

The configuration program saves the profile on a disk(ette). This profile is read from the disk(ette) during the Emulation Program load procedure, and the information is used to configure your system unit prior to execution of the Emulation Program. See "Configuring for Emulation" on page 2-18 for operation of the configuration program.

Using Sign-On Passwords

Anyone who uses a system unit to access the host may need a password to sign on to the host system. If a password is needed, see the person with the appropriate host system authority.

Chapter 2. Preparing the Emulation Program

Introduction

This chapter is intended for the person who is preparing the Emulation Program disk(ette) for operation.

If you have not installed and tested the Enhanced Display Station Emulation Adapter, you may go to the Enhanced Display Station Emulation Adapter *Guide to Operations* manual and perform the installation. If you prefer, you can prepare the Emulation Program and configure your system unit before installing the Adapter.

Backing Up the Emulation Program Diskette

It is recommended that you create a backup copy of the program diskettes. Use the backup copies for all work.

The DISKCOPY program prompts you to insert source and target diskettes. *Source* diskettes are the program diskettes, and *target* diskettes are the backup diskettes. You can use formatted or unformatted diskettes. The DISKCOPY command will format the diskette, if necessary. Refer to your operating system manual for further information on DISKCOPY, if necessary.

Backing Up with Two Diskette Drives

If the system unit has two diskette drives, use this procedure to back up:

1. Insert the first program diskette into the A: drive. Insert a backup diskette into the B: drive.

2. Type **DISKCOPY A: B:** and press ENTER. The program diskette is copied to the backup diskette. You are then prompted to copy another diskette.

3. Remove the diskettes and label the backup diskette.

4. Repeat these steps for the second program diskette.

5. Store the program diskettes in a safe place.

Backing Up with One Diskette Drive

If the system unit has one diskette drive, use this procedure to back up:

1. Insert the first program diskette into the drive.

2. Type **DISKCOPY A: A:** and press ENTER. The program prompts you to insert a diskette.

3. Remove the program diskette from the drive, and insert the backup diskette, as prompted.

4. Remove the diskettes and label the backup diskette.

5. Repeat these steps for the second diskette.

6. Store the program diskettes in a safe place.

Program Installation for a Fixed Disk Drive System

This installation procedure should only be followed if your system unit has a fixed disk and at least one diskette drive. Refer to "Program Installation for a Diskette Drive Only System" on page 2-5 if your system unit does not have a fixed disk.

Installing the Emulation Files

The diskette drive in your system is probably identified as drive A and the fixed disk as drive C. If not, substitute the correct drive letters in the steps below. The Emulation Program will be placed in a subdirectory called 5250EMU. You may substitute the name of this subdirectory in the steps below.

1. Type **C:**

2. Press ENTER.

3. Type **md\5250EMU**

4. Type **cd\5250EMU**

5. Insert Program Diskette 1 (3.5 inch or 5.25 inch) into diskette drive A. Then type
   COPY A:*.* C:

6. Remove the program diskette. If you are using 5.25 inch diskettes, repeat the previous step with Program Diskette 2.

Note: You may want to add the PATH and APPEND commands to the AUTOEXEC.BAT file in your root directory. The commands specify the program directory, in this case, 5250EMU, in the search path. That way, you will not need to move to the program directory every time you wish to use 5250 emulation. Consult your operating system manual for more information on the PATH and APPEND commands and the AUTOEXEC.BAT file.

If you do not plan to use host graphics support, the installation is complete. Proceed to "Ending Installation" on page 2-4.

Installing Graphics

The steps outlined in "Installing the Emulation Files" on page 2-2 must be executed before installing graphics.

1. Insert Program Diskette 2 (3.5 inch) or Program Diskette 3 (5.25 inch) into diskette drive A. Then type
   COPY A:*.* C:

2. Remove the program diskette. If you are using 5.25 inch diskettes, repeat the previous step with Program Diskette 4.

Editing CONFIG.SYS

A file called CONFIG.SYS was copied from the program diskette to the subdirectory 5250EMU that includes the following lines:

```
BUFFERS = 16
FILES = 16
DEVICE = VDIDY010.SYS /R
DEVICE = VDI.SYS /R
BREAK = ON
```

If you do not have a CONFIG.SYS file in the root directory, you may copy this file to the root directory. Type
COPY C:\5250EMU\CONFIG.SYS C:

If you already have a CONFIG.SYS file you should append these lines using the EDLIN program or a text editor. See your operating system manual for instructions on how to use EDLIN.

Depending on the type of display and graphics adapter used in your system the virtual device driver listed in the CONFIG.SYS may have to be modified. Refer to "Selecting Graphics Device Drivers" on page 2-13 to decide which device driver you need. Use an editor to edit CONFIG.SYS to reflect the appropriate device driver and modify the statement 'DEVICE = VDIDY010.SYS /R'.

Note: It is important that the two 'DEVICE = ' statements are listed only in the order shown in the example on page 2-3.

Editing AUTOEXEC.BAT
Use an editor to modify or create an AUTOEXEC.BAT file in your root directory. Add the following lines to the batch file:

```
MODE CO80
CD\5250EMU
INIT_VDI.EXE
CD\
```

Note: If you include the command to run the Emulation Program in the AUTOEXEC.BAT file, it must follow INIT_VDI. You can include other commands in AUTOEXEC.BAT. See "Automatically Loading Programs" on page 3-4 for examples.

Ending Installation

The following steps assist you in ensuring that you installed correctly.

1. Check the contents of the emulation directory. At the DOS prompt, type
   DIR
   Check that the files you selected are in the directory. (See "Files on the Program Diskette" on page 2-8.)

2. If you installed graphics, you must reset the system unit to reload DOS. Press the Alternate, Control, and Delete sequence.

3. Store your original and backup program diskettes in a safe place.

You now have a working subdirectory that you need to configure for emulation, including host graphics support. Refer "Configuring for Emulation" on page 2-18 to configure your complete system.

Program Installation for a Diskette Drive Only System

This installation procedure should only be followed if your system unit does not have a fixed disk drive. Refer to "Program Installation for a Fixed Disk Drive System" on page 2-2 if your system unit has a fixed disk.

If you have not made backup copies of your program diskettes, refer to "Backing Up the Emulation Program Diskette" on page 2-1 and do so now. Then, use the backup copies of your program diskette in the steps below to create working diskettes for your diskette drive only system.

You cannot use the Emulation Program without first loading DOS on the system unit.

Since your system does not have a fixed disk, you will need to create working diskettes (1 for a non-graphics system and 2 for

a graphics system). You may want to include other DOS pro-
grams on these diskettes that are used frequently.

Building Your Working Diskettes

Use the following instructions to build your working diskettes. If
you plan to use the Emulation Program without graphics
support, you need to build one diskette. If you plan to use the
Emulation Program with graphics support, you need to build two
diskettes. The first diskette is used when you run the Emulation
Program. The second diskette is used when you configure the
Emulation Program (CONFIG) and when you configure the Emu-
lation Program with host graphics support (GCONFIG).

Emulation Without Graphics Support

If you do not plan to use host graphics support, do the following:

1. Use the DOS FORMAT command without specifying the /S
   parameter to format a working diskette.

2. Immediately after the FORMAT is complete, use the SYS
   command to copy the system files to your formatted working
   diskette. COMMAND.COM is not copied.

3. Copy all files on Program Diskette 1 to your working
   diskette.

4. If you are using 5.25 inch diskettes, copy the appropriate
   PFT file, if necessary, from Program Diskette 2 to your
   working diskette. See "Files on the Program Diskette" on
   page 2-8 to decide which PFT file you need.

   Note: If you need to create a PFT file, refer to the Technical
   Reference manual.

5. Erase CONFIG.SYS on your working diskette.

6. Erase all files on your working diskette with a file extension
   of BAS. (Type **ERASE *.BAS**).

7. Copy COMMAND.COM from the DOS diskette to the working
   diskette.

8. You can now use this working diskette to configure for the
   Enhanced 5250 Emulation Program (see "Configuring for
   Emulation" on page 2-18).

Emulation With Graphics Support

If you plan to use host graphics support:

1. Use the DOS FORMAT command without specifying the /S parameter to format two working diskettes.

2. Label one diskette as the first working diskette and the second diskette as the second working diskette.

3. Use the SYS command to copy the system files to your formatted working diskette. The second working diskette does not require the system files.

4. Copy the following files from your Program Diskettes to working diskette 1. Refer to "Files on the Program Diskette" on page 2-8 to see which files are on each diskette.

   - DP5250.COM
   - PRT5250
   - CONFIG.SYS
   - KBxxxx.PRO (See Note 4a.)
   - PCGRAPH.COM
   - PCVDI.EXE
   - GR5250.COM
   - INIT_VDI.EXE
   - VDI.SYS
   - VDIDYxxx.SYS (See Note 4b.)
   - IBMxxxx.PFT (See Note 4c.)

   Notes:

   a. A keyboard profile is needed. See "Files on the Program Diskette" on page 2-8 to decide which keyboard profile you need.

   b. Refer to "Selecting Graphics Device Drivers" on page 2-13 to select the VDI driver device driver for the type of graphics display you want to use.

   c. The Emulation Program supports a number of system attached printers, some of which require a PFT file. See "Files on the Program Diskette" on page 2-8 to decide which PFT file you need, if any. If you need to create a PFT file, refer to the Technical Reference manual.

5. Copy COMMAND.COM and MODE.COM from your DOS diskette to working diskette 1.

6. Copy the following files from your Program Diskettes to working diskette 2:

   - CONFIG.EXE
   - SCR5250.TXT
   - HLP5250.TXT
   - GCONFIG.EXE
   - SCR5292.TXT
   - HLP5292.TXT

7. Use an editor to edit CONFIG.SYS on the first working diskette to reflect the device driver you selected. For example, DEVICE = A:VDIDY010.SYS /R may need to be modified to correspond to your virtual interface driver selected during step 4.

8. Use an editor to create an AUTOEXEC.BAT file on the first working diskette. Add the following lines to the AUTOEXEC.BAT batch file:

   - MODE CO80
   - INIT_VDI.EXE

   Note: For proper initialization of the Virtual Device Interface (VDI) device drivers, the INIT_VDI.EXE program must be on the same diskette as the device drivers.

You now have the two working diskettes that you need to configure for emulation (CONFIG) and run host graphics support (GCONFIG). Refer to "Configuring for Emulation" on page 2-18 to configure your complete system.

Files on the Program Diskette

The Emulation Program is contained on four 5.25 inch diskettes and two 3.5 inch diskettes. The files required for emulation are contained on Program Diskette 1 (3.5 inch) and Program Diskettes 1 and 2 (5.25 inch). If you plan on emulating with host graphics support, the files on Program Diskette 2 (3.5 inch) and Program Diskettes 3 and 4 (5.25 inch) are also required.

Note: Do not use a DOS editor to edit the Emulation Program files. You should only use the configuration program to edit these files.

A description of each of the emulation files follows:

File Name Diskette 1:	Description 3.5 inch and 5.25 inch
READ-ME.TXT	Supplemental Documentation.
DP5250.COM	Emulation Program for either display or printer sessions.
PRT5250	Printer emulation program that will be loaded if the printer session is configured.
CONFIG.EXE	Display/Printer configuration program.
SCR5250.TXT	Configuration program screen.
HLP5250.TXT	Configuration program help text.
CONFIG.SYS	The system configuration file is used by the system unit to identify the device drivers programs required to operate each of the devices that are not already identified in the Disk Operating System.
KB5250.PRO	Keyboard profile for the 5250 style keyboard emulated on a personal computer, Personal Computer XT, Personal Computer XT 286, or Portable Personal Computer keyboard. This is the default keyboard for these system units.
KBA5250.PRO	Keyboard profile for the 5250 style keyboard emulated on an AT keyboard. This is the default keyboard profile for the Personal Computer AT keybaord.
KBPC.PRO	Keyboard profile in pc style for the Personal Computer, Personal Computer XT, Personal Computer XT 286, or Portable Personal Computer style keyboard.

KBAPC.PRO   Keyboard profile in pc style for the Personal Computer AT style keyboard.

KBEPC.PRO   Keyboard profile in pc style for the PS/2 Enhanced keyboard, or the PS/2 Space Saving keyboard.

EMDP.BAT   A sample AUTOEXEC program to automatically load emulation with display and printer support.

EMG.BAT   A sample AUTOEXEC program to automatically load emulation with display and graphics support.

SS2.BAS   This program copies the contents of the emulated display screen to a diskette file. The screen is displayed as it is saved.

SUBS.BAS   BASIC subroutine to check if the Emulation Program is loaded and to initialize access pointers into the emulator data segment.

UL.BAS   This program serves as an example program to transmit PS/2 or personal computer files to an attached host system.

ASO.BAS   This sample program allows you to sign on automatically to the host from a BASIC application program.

SS.BAS   This program copies the contents of the emulated display screen to a diskette file. The screen is not displayed as it is saved.

File Name	Description
Diskette 2:	**5.25 inch (for 3.5 inch, these files are on diskette 1)**
PFTSETUP.COM	The printer function table setup program.
PFTWS.PRN	Printer function table worksheet.
PFTA0100.HP1	Help text for the printer function table setup program.
PFTA0100.PG1	Program to support the printer function table setup program.
DEFAULT.PFT	A sample printer function table to support the operation of other manufacturer's attached printers.
HPLASER2.PFT	A printer function table to support the operation of the HP LaserJet Series II printer.
IBM3812.PFT	A printer function table to support the operation of the IBM 3812 PagePrinter.
IBM4202.PFT	A printer function table to support the operation of the IBM 4202 Proprinter XL.
IBM4208.PFT	A printer function table to support the operation of the IBM 4208 Proprinter XL 24.
IBM5202.PFT	A printer function table to support the operation of the IBM 5202 Quietwriter III.
IBM5204.PFT	A printer function table to support the operation of the IBM 5204 Quickwriter.
File Name	**Description**
Diskette 3:	**5.25 inch (for 3.5 inch, these files are on diskette 2)**
PCGRAPH.COM	Graphics program to support the graphics functions available with one of the 5250 emulated display sessions.
PCVDI.EXE	VDI interface module, required to support graphics.

GR5250.COM	DOS session enable screen graphics program.
INIT_VDI.EXE	The VDI initialization program for VDI.
VDI.SYS	The VDI program required by all graphics configurations.
GCONFIG.EXE	Graphics configuration program.
SCR5292.TXT	Graphics configuration program screen.
HLP5292.TXT	Graphics configuration help text.
VDIDY004.SYS	Device driver for 5153/CGA with 320 x 200 resolution.
VDIDY006.SYS	Device driver for 5153/CGA with 640 x 200 resolution.
VDIDY00D.SYS	Device driver for 5153/EGA with 320 x 200 resolution.
EMPATCH.COM	Patch program to allow updates to the Emulation Program.
EMPANA.MRI	Screen panels and messages to support the emulation patch program.
File Name	**Description**
Diskette 4:	**5.25 inch (for 3.5 inch, these files are on diskette 2)**
VDIDY00E.SYS	Device driver for 5153/EGA with 640 x 200 resolution.
VDIDY00F.SYS	Device driver for 5151/EGA with 640 x 350 resolution.
VDIDY010.SYS	Device driver for 5154/EGA with 640 x 350 resolution.
VDIDY011.SYS	Device driver for a PS/2 Display/VGA with 640 x 480 resolution and two colors.
VDIDY012.SYS	Device driver for a PS/2 Display/VGA with 640 x 480 resolution and 16 colors or gray shades.

VDIDY013.SYS   Device driver for a PS/2 Display/VGA with 320 x 200 resolution and 16 or 256 colors or 64 gray shades.

VDIDYA11.SYS   Device driver for a PS/2 Display/MCGA with 640 x 480 resolution and 16 gray shades.

VDIDYA13.SYS   Device driver for a PS/2 Display/MCGA with a 320 x 200 resolution and 16 or 256 colors.

VDIDYPGD.SYS   Device driver for 5175/PGA with 640 x 480 resolution.

Selecting Graphics Device Drivers

One of the files you copied to your fixed disk or working diskette is called CONFIG.SYS. DOS looks for this file, when it is started, to establish the working environment.

This file must be modified to include the Virtual Device Interface (VDI) routines. VDI requires two entries. The device drivers must be in the current directory or have a path defined to the directory where they are located. You will need to select a driver from Figure 2-1 on page 2-14 if you wish to run emulation with host graphics support.

Figure 2-1. CONFIG.SYS Device Drivers for Displays and VDI			
Display/Adapter	**Resolution**	**Number of Colors**	**Device Driver**
5151 EGA	640 x 350	4 Pixel Styles	VDIDY00F
5153 CGA	640 x 200 320 x 200	2 4	VDIDY006 VDIDY004
5153 EGA	320 x 200 640 x 200	16 16	VDIDY00D VDIDY00E
5154 EGA	640 x 350 640 x 350	4 16 (See Note 1)	VDIDY010 VDIDY010
5175 PGA	640 x 480	256	VDIDYPGD
8503, 8507, 8512, 8513, or 8514 VGA	640 x 480	2	VDIDY011
8503 or 8507 VGA	640 x 480	16 gray shades	VDIDY012
8512, 8513, or 8514 VGA	640 x 480	16	VDIDY012
8503 or 8507 VGA	320 x 200	64 gray shades	VDIDY013
8512, 8513, or 8514 VGA	320 x 200	16 or 256 (See Note 2)	VDIDY013
8503 or 8507 MCGA	640 x 480	16 gray shades	VDIDYA11 or VDIDYA13
8512, 8513, or 8514 MCGA	320 x 200	16 or 256 (See Note 2)	VDIDYA13

Notes:

1. EGA memory expansion option and modules (for a total of 128K) is required for full 16 color support.

2. The number of colors depends on the type of hardware adapter.

The format of the display device driver entry must be:

`DEVICE=[d:][path]driver.SYS /R`

The last VDI entry must be:

`DEVICE=[d:][path]VDI.SYS`

Where:

d:
   represents the disk(ette) identifier,

[path]
   represents the name of the directory that contains the VDI device driver,

driver.SYS
   is the name of the file containing the device driver for VDI.

/R
   is a parameter that states the driver is resident.

Addressing Work Stations

A work station device can be either a display or a printer. The host does not allow displays and printers to share the same address, and each address must be defined as either a display or a printer.

The configuration program assigns a single address for the primary (first display) session but allows you to add up to six other addresses with its advanced options. See "Work Station Address List" on page 10-5 for more information about how to use this option. The first address should be a unique address for the primary or only display session of each device on the line. The configuration allows you to enter a list of addresses

(that is, an address search list) for the second session. The Emulation Program listens to the line and searches the list for the first address that is not being used by any other work station.

The addresses on the list for the system units on a line should be rotated to reduce the chance of an address conflict. See the following examples.

Example 1

This example shows four attached personal computers. Station addresses 0 through 5 are configured as displays on the host. Address 6 is configured as a printer.

Work Station/Session	Address(es)
system unit #1	
first display	0
second display	4, 5
printer	6
system unit #2	
first display	1
second display	5, 4
printer	6
system unit #3	
first display	2
second display	4, 5
printer	6
system unit #4	
first display	3
second display	5, 4
printer	6

Example 2

This example shows three system units and a 3196 attached. Station addresses 0 through 4 are configured as displays on the host. 5 and 6 are configured as printers.

Note: A system unit can not use the address assigned to the 3196 display.

Work Station/Session	Address(es)
system unit #1	
first display	0
second display	4
printer	5, 6
system unit #2	
first display	1
second display	4
printer	6, 5
system unit #3	
first display	2
second display	4
printer	5, 6
display unit	
3196	3

If you choose to assign (1) two display sessions and (2) a display session and a printer session to each system unit, then you would need three unique addresses for each system unit. This would limit you to two units on each work station line. By sharing the addresses used for the second session of each system unit, you can have five system units on each line. This is done with the address search list for the second session.

The second session of the Emulation Program can have up to six addresses in a search list. If the program has a list of addresses assigned to it and the program attempts to come up, it may use the address assigned to some other 5250 Information Display System compatible device. To prevent this, each device on the line should be assigned a unique address for its first

session - an address that is only responded to by that device. By doing this, each device always has access to at least one session on the host.

You could use two profiles. Both would use the first session as a display session. The first profile would use an address list for a display for its second session. The second profile would use an address list for a printer for its second session. The addresses for the second session can be shared with other Enhanced Emulation Programs on the line.

See "Data Security" on page xvii for data security concerns for address lists.

Notes:

1. The Emulation Program selects the first available address in the list you provide.

2. When configuring your Emulation Program, do not mix display and printer addresses in the same address list.

3. If two work stations attempt to use the same address at the same time, the host does not talk to either of them.

Configuring for Emulation

You must run the configuration program (CONFIG) before the Emulation Program is used. The configuration program generates a profile or modifies an existing profile that identifies the parts of your system unit and allows them to communicate with each other. This program shows the available options and helps the user to select those that apply. This program is only used when there is a need to create a new profile (for example, change printers or number of sessions) or to change an existing profile.

The graphics configuration program (GCONFIG) is executed as a stand-alone program using an existing configuration data file as input. This file is processed at graphics initialization time and must reside on the default drive. Refer to "Configuring for Host

Graphics" on page 10-9 if you want to change the default graphic characteristics.

Notes:

1. Files SCR5250.TXT and HLP5250.TXT must be available within the same directory on the system unit when CONFIG.EXE (the configuration program) is executed.

2. If a configuration profile (a file with a .DAT extension) is not available within the current directory, a single display session with address 0 is started.

The configuration program provides prompts for the general user, to which responses must be made. Those responses result in a complete and usable configuration. The general user's prompts are followed by an optional second group of prompts (advanced options) that allow a user with a more technical background to further customize the Emulation Program. See Chapter 10, "Advanced Configuration" on page 10-1 for more detail about these advanced options. After the program for the general user has been completed, you may quit, save the profile, or you may continue through the advanced options.

The configuration program can be used with a system unit before the Adapter is installed in the unit. It is not necessary to wait until the system unit is connected to the host.

Configuring 2.12 Emulation Profiles to 2.2 Level

If you have existing work profiles from Version 2.12 of the IBM Enhanced 5250 Emulation Program, these profiles can be updated to be usable with Version 2.2. To update, run CONFIG.EXE using your existing 2.12 configuration data file as input. When the profile is saved, it is updated to the 2.2 level format required by the Emulation Program. Previous selected option values remain unchanged.

Keyboard profile data sets from Version 2.12 are compatible with Version 2.2. No updates are required. Any keyboard profile data sets from a software version below 2.12 are not compatible. Refer to the Technical Reference manual for instructions on defining a keyboard.

Printer Description Table (PDT) data sets are not compatible with Version 2.2. The PFTSETUP command must be executed for user defined printers. Refer to the Technical Reference manual for more information about printer function tables.

Using the Configuration Program

Use the following checklist to assist in planning or to record the entries as you operate the configuration program. They are not intended to replace the configuration program's help text.

Number of Sessions (1 or 2): _____

Name of Keyboard Profile:

KBPC.PRO   _____
KBAPC.PRO   _____
KBEPC.PRO   _____
KB5250.PRO   _____
KBA5250.PRO   _____
Yourfile.PRO   _____

Host Assigned Work Station Addresses:

Primary display address   _____
Secondary work station address _____

Session Type for Second Session (optional):

5224/25 Printer   _____
5256 Printer   _____
5219 Printer   _____
Display   _____

PC Attached Printer (optional):

IBM PC Graphics Printer (5152-1)   _____
IBM PC Matrix Printer (5152-2)   _____
IBM PC Proprinter (4201)   _____
IBM Proprinter XL (4202)   _____
IBM Proprinter X24 (4207)   _____
IBM Proprinter XL24 (4208)   _____
IBM Wheelprinter (5216)   _____

IBM Color Printer (5182) _____

IBM Quietwriter Printer (5201) _____

IBM Quietwriter III (5202) _____

IBM Quickwriter (5204) _____

IBM Pageprinter (3812) _____

HP LaserJet Series II printer _____

User-defined printer _____

Name of Emulation Program Profile (optional):

DP5250.DAT _____

yourfile.DAT _____

Notes:

1. The configuration program only generates a default profile named DP5250.DAT.

2. The IBM Portable Personal Computer requires that you go to the advanced options menu for correct display parameters.

3. The configuration program provides advanced options for experienced programmers. The options follow the basic options just mentioned and have help text. Refer to Chapter 10, "Advanced Configuration" on page 10-1 for more information.

4. You must use the GCONFIG.EXE program for graphics plotter support. See "Graphics Configuration Procedure" on page 10-11 for more information.

5. For information on the Printer Function Setup program, see the Technical Reference manual.

Running Configuration on a Fixed Disk Drive System

This procedure should only be followed if your system unit has a fixed disk and at least one diskette drive. Refer to "Running Configuration on a Diskette Drive Only System" on page 2-23 if your system unit does not have a fixed disk.

Make sure you are in the emulation directory before following these steps.

1. At the DOS prompt, type

   CONFIG

   If a configuration profile is to be changed, type

   CONFIG *yourfile*.**DAT**

   where *yourfile* is DP5250.DAT or your configuration profile.

2. Type the appropriate responses for each screen using the program's help text.

   If you plan to use host graphics support, do the following at the Advanced Options Menu:

   a. Select option 3 (Select Display Emulation Options) and press ENTER.

   b. At the Advanced Display Emulation Options screen, select option 4 (Select Emulated Display Device and PC/5292-2 Graphics) and press ENTER.

   c. At the Emulated Display Device Options screen, select option 2 (Host Graphics Support) for Session 1 or Session 2 prompts and press ENTER.

   d. Select option 1 at the Advanced Display Emulation Options screen to save your work or continue working with advanced options.

3. Save your updates by selecting option 1 at the Advanced Display Emulation Options screen. Write down the filename that you used (for example DP5250.DAT)

4. Select option 2 to exit the Emulation Program.

You are now ready to start the Emulation Program. Proceed to Chapter 3, "Operating the Emulation Program" on page 3-1.

Note: You may want to change some of the default graphics characteristics for your session at this time. You must do this if you plan to attach and use a plotter. Refer to "Configuring for Host Graphics" on page 10-9 for more information.

Running Configuration on a Diskette Drive Only System

This procedure should only be followed if your system unit does not have a fixed disk drive. Refer to the "Running Configuration on a Fixed Disk Drive System" on page 2-21 if your system unit has a fixed disk.

Before continuing with configuration, you should have created one or two working diskettes for a system unit without a fixed drive. Refer to "Program Installation for a Diskette Drive Only System" on page 2-5 if you have not created your working diskette(s).

1. If your system unit is not powered on, start it with your first working diskette.

2. If you created two working diskettes (for host graphics support), replace working diskette 1 with working diskette 2 in Drive A. Otherwise, leave (or insert) working diskette 1 in Drive A.

3. At the DOS prompt, type

   CONFIG

   If a configuration profile is to be changed, type

   CONFIG *yourfile*.DAT

   where *yourfile* is DP5250.DAT or your configuration profile.

   Note: The configuration profile always needs to be on working diskette 1 when the Emulation Program is started. If you are using two working diskettes and want to run the configuration program (CONFIG) against your existing profile, you must copy the configuration profile from working diskette 1 to working diskette 2.

4. Type the appropriate responses for each screen using the program's help text.

   If you do not plan to use host graphics support, go to step 5. If you plan to use host graphics support, do the following at the Advanced Options Menu:

   a. Select option 3 (Select Display Emulation Options) and press ENTER.

b. At the Advanced Display Emulation Options screen, select option 4 (Select Emulated Display Device and PC/5292-2 Graphics) and press ENTER.

c. At the Emulated Display Device Options screen, select option 2 (Host Graphics Support) for Session 1 or Session 2 prompts and press ENTER.

d. Select option 1 at the Advanced Display Emulation Options screen to save your work or continue working with advanced options.

5. Save your updates by selecting option 1 at the Advanced Display Emulation Options screen. Write down the filename that you used (for example DP5250.DAT)

6. Select option 2 to exit the Emulation Program.

7. If you created two working diskettes (for host graphics support), copy the configuration profile DP5250.DAT (or *yourfile*.DAT) to working diskette 1.

You can now use working diskette 1 to start the Emulation Program.

Note: You may want to change some of the default graphics characteristics for your session at this time. You must do this if you plan to attach and use a plotter. Refer to "Configuring for Host Graphics" on page 10-9 for more information.

Updating the Emulation Program

If you experience problems, IBM may instruct you to update the Emulation Program. Refer to Appendix C, "Updating the Emulation Program" on page C-1, for detailed instructions.

Chapter 3. Operating the Emulation Program

Introduction

This part of the manual is intended for the person who is using a PS/2 or personal computer with the Emulation Program.

If you have not installed and tested the Adapter, go to the Enhanced Display Station Emulation Adapter *Guide to Operations* manual and do so at this time.

Make sure all devices attached to the system unit are turned on before loading the Emulation Program. You cannot use the Emulation Program without first loading the IBM Disk Operating System (DOS).

Note: To process graphics data in a host graphics session, the GR5250.COM program must be running in the DOS session.

There are two Emulation Programs, DP5250.COM and PRT5250. DP5250.COM provides the display session capabilities and the functionality for emulation. PRT5250 provides the printer session capabilities and is loaded by DP5250.COM only if a printer session is configured. Only DP5250.COM needs to be run.

Loading the Programs

Before you can begin, you must load DOS. Refer to the appropriate user's guide for help in loading DOS. You must also have created an emulation profile by using the CONFIG.EXE program that is located on the Emulation Program diskette. VDI must also be loaded for the graphics session (see "Selecting Graphics Device Drivers" on page 2-13).

The process of loading programs on a system unit is not limited to one method. The sequence in which the programs are loaded is critical.

The Emulation Program may be loaded either step by step (see "Loading from the DOS Prompt") or may be loaded automatically (see "Automatically Loading Programs" on page 3-4).

Loading from the DOS Prompt

When loading a program from the DOS prompt, values can be provided (as parameters) with the command that invokes the program. These values may specify a profile data set and a keyboard profile. The parameters must follow the program name with one space between the program name and the first parameter.

See the Technical Reference manual to patch or modify the program and patch the on-card memory.

The **profile data set** is specified as follows:

DP5250 I=B:*yourfile*.DAT

This would load profile tables from a file named *yourfile*.**DAT** located in the root directory on drive B. You may remove the \ (backslash) to use the profile dataset in the current subdirectory. If a profile data set is not specified, DP5250.DAT is loaded as the profile. See "Configuring for Emulation" on page 2-18 for more information about profiles.

If an error occurs during the reading or opening of a profile, a *file not found* error message is displayed. If a problem occurs after opening the profile, the *Unusable Initialization Data* error message is displayed. See Appendix A, Handling Error Codes and Messages for additional information.

The **keyboard customization file** is specified as:

DP5250 K=B:\KBPC.PRO

The keyboard customization file name is normally provided by the profile data set. By specifying a different file name on the

command line, you can use a different keyboard customization file than the one contained in the profile data set.

These parameters may be on the same command line. For example,

DP5250 I=B:*yourfile***.DAT K=B:\KBPC.PRO**

If a keyboard customization file is not specified either in the profile or on the command line, then KB5250.PRO (5250 style keyboard) is loaded.

DOS, the Emulation Programs, and the Graphics feature programs may be stored on fixed disk or diskette(s) or both. First load DOS, then load the Emulation Program. An AUTOEXEC.BAT file may be used. For additional information on loading the programs, refer to the *IBM Disk Operating System* manual.

The **attached printer function table.(PFT) file** is specified as:

DP5250 P=B:*printable***.PFT**

The PFT file describes the characteristics of an otherwise unsupported printer to the Emulation Program. This parameter is ignored if the user does not specify the need to support a different printer when running the configuration program.

If you do not specify a file name with this parameter, the file name placed in the initialization data file by the configuration program is used.

Note: The Emulation Program is designed to have only one copy of the program in memory at a time. An error message is displayed if you attempt to load a second copy.

Automatically Loading Programs

If you use an AUTOEXEC.BAT file to load your Emulation Program, it is assumed that DOS COMMAND.COM and the Emulation Program are loaded in the same directory or a path has been established for DOS to find the files. You may want to include the **DATE** and **TIME DOS** commands in the AUTOEXEC.BAT file. The system unit date and time are used only on PS/2 and personal computer applications, and are independent of the host date and time. (See "Loading the Programs" on page 3-1 if you are not using an automatic batch file.)

Adding DP5250 to your AUTOEXEC.BAT file, after the **DATE** and **TIME** commands, automatically loads the Emulation Program. Program parameters can be added to the command line as part of the AUTOEXEC.BAT file. "Loading from the DOS Prompt" on page 3-2 gives examples of parameters.

Program parameters can appear in any combination, with spaces required between parameters but not allowed between characters within parameters. When two conflicting parameter codes are typed, the last parameter code in a left-to-right scan is used. Invalid program parameters are identified in an error message.

If another parameter follows a program name, then blanks are required. For example, a blank (or space) must be used between **DP5250** and **I** = *myfile*.**DAT** as shown in the following example:

A>DP5250 I=*myfile*.DAT

Commands may be specified on separate lines in an automatic batch file as shown in the following example:

DATE
TIME
INIT_VDI
DP5250
pc application program name

This sequence prompts you for the current date and time, initializes the VDI interface, loads the Emulation Program, and brings

the host online without further operator involvement. The application program is then automatically loaded.

Notes:

1. This AUTOEXEC.BAT file assumes that the automatic Hot Key option was selected during execution of the configuration program (CONFIG.EXE).

2. INIT_VDI is required in the AUTOEXEC.BAT if graphics support is to be used.

Starting Host Graphics Support from a Batch File

To display graphics data in the Host Graphics session, GR5250.COM must be running in the DOS session. If you choose to start the Emulation Program from a batch file, you may also want to start GR5250.COM from the batch file. To do this, follow the steps outlined below. See "Emulated Display Device" on page 10-3 for more information on choosing advanced display emulation options for graphics.

1. From the Advanced Options Menu of the configuration program (CONFIG), select Option 3 - Select Display Emulation Options.

2. From the Advanced Display Emulation Options Menu, select Option 3 - Select Additional Display Options.

3. From the Select Additional Display Options Menu, select the following:

   Option 1 - Bypass Presign-on Screen. This will cause the presign-on screen to be skipped when the Emulation Program is started.

   Option 2 - Immediate Hot Key Option. Once the Emulation Program has established communications with the host, an automatic hot key will return you to the DOS session.

4. From the Advanced Display Emulation Options Menu, select Option 4 - Select Emulated Display Device and PC/5292-2 Graphics. Configure the session for Host Graphics support.

Create a Batch File Using the Sample

SAMPLE:

rem ---------sample batch file-------------

    -

    -(represent other commands

    -in the batch file)

    -

rem ---starts the Emulation Program using

rem ---configuration data contained in

rem ---*yourfile*.**DAT**. The options selected

rem ---in CONFIG (option 3 on page 3-5) will cause the

rem ---Emulation Program to start, and hot

rem ---key back to the DOS session. GR5250

rem ---is then started in the DOS session.

    -

    -

DP5250 i = *yourfile*.**DAT**

GR5250

    -

    -

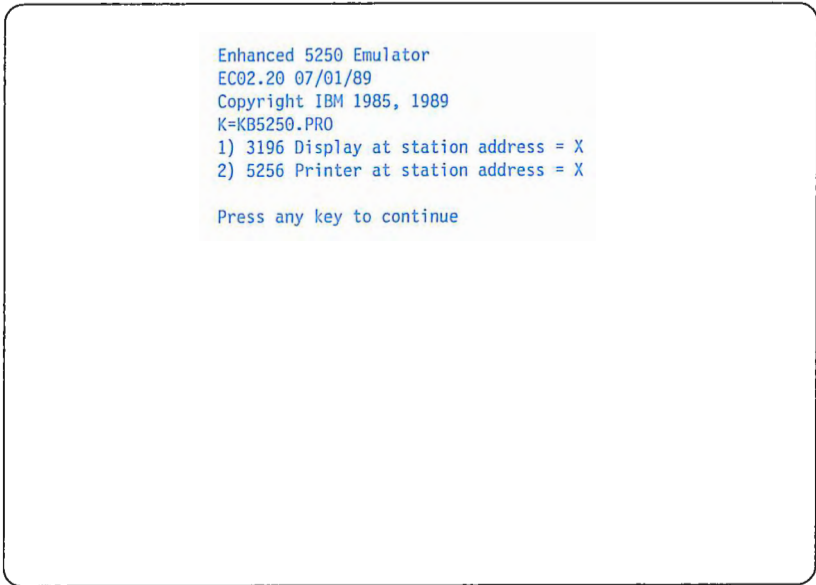rem ---------end of sample batch file---------

Notes:

1. Remember that GR5250.COM continues to run in the DOS session. Other routines can not be run from the DOS session, manually or from a batch file, until GR5250.COM has been terminated.

2. If the batch file is AUTOEXEC.BAT the INIT_VDI.EXE program must be executed before starting the Emulation Program.

Starting the Emulation Program

After you have loaded DOS and DP5250.DAT, and the 5250 emulation card is found and passes a memory test, a presign-on screen similar to that shown in Figure 3-1 on page 3-7 should appear. If you have not specified bypass of the Presign-On Screen and it does not appear, refer to Appendix B, Handling Problem Determination.

Note: At this point the keyboard only responds as defined by the keyboard profile selected during Emulation Program configuration. The examples in this chapter assume that the keyboard used is the 5250 style Personal Computer keyboard stored in KB5250.PRO.

```
Enhanced 5250 Emulator
EC02.20 07/01/89
Copyright IBM 1985, 1989
K=KB5250.PRO
1) 3196 Display at station address = X
2) 5256 Printer at station address = X

Press any key to continue
```

Figure   3-1. The Presign-On Screen

The numbers at the start of the fifth and sixth lines of the pre-sign-on screen are the session numbers, and the numbers at the end of the fifth and sixth lines are the work station addresses for those sessions. Line four is the keyboard profile that was chosen during configuration.

Operating in Emulation Mode

Although the presign-on screen is displayed, your system unit is not yet online with the host. The presign-on screen identifies the program and the engineering change level and displays the copyright notice.

When you press a key, DP5250 (the Emulation Program) attempts to communicate with the host using the addresses in the profile. The work station addresses being attempted are displayed in a blinking message while the activity is in progress. After the system unit comes online with the host, an alarm sounds and the presign-on screen is replaced with a host screen. The keyboard is now in emulation mode and is defined by the keyboard customization file. The status is on line 25 of the display screen. Refer to Chapter 4, Using the Display Screens, for an explanation of the status line indicators.

If the Adapter is operational, the host sign-on screen appears. Otherwise an error message appears on the presign-on screen. Refer to Appendix A, Handling Error Codes and Messages, for further information.

Notes:

1. If the address is already being used by another work station, the message Station Address Already In Use is displayed.

2. If a work station that is not capable of searching for an address is turned on and its address is already in use, the device using this address has its session interrupted and the work station starting up is unable to establish its session (address contention).

3. If the Emulation Program is loaded on two or more system units using the same work station address within an 8-second period, the host (or controller) may quit talking to both devices. If this occurs, reload the Emulation Program on the first system unit, wait at least 8 seconds, then load the Emulation Program on the second system unit.

If an error is detected by the host during online operation, it is displayed as a 4-digit error code on the left end of line 25. Refer

to Appendix A, Handling Error Codes and Messages for descriptions of the error codes. Errors not defined in Appendix A may be found in Appendix B, Handling Problem Determination.

When you have successfully loaded DP5250, your system unit emulates a display, a 5250 keyboard, and either a second display or printer, if two sessions were chosen during configuration. You should use the appropriate *Keyboard Templates* as a reference for the PS/2 or personal computer keyboard. See Figure 5-4 on page 5-11 to identify the templates.

To support hosts and controllers using the auto-configuration feature, the Emulation Program must be loaded and brought online prior to the host or controller being turned on. You must ensure that every system unit on the work station line has a unique work station address for every system unit session. Then, when the *System Not Available for Station Ax* message is displayed, select the *Ignore* option.

For information about how each key and key sequence on the emulated keyboard works, refer to Chapter 5, Using the Keyboard.

To use the functions of the host, you must be signed on to the host. Check with the person with the appropriate host system authority for your sign-on requirements (password).

If contact has been established with the host, the System Available indicator comes on, and either the cursor is displayed in the upper left corner of the display screen *or* a sign-on screen appears.

If contact has not been made with the host, the System Available indicator is off and the cursor is displayed in the upper right corner of the display screen.

Starting GR5250.COM

To display graphics data in the Host Graphics session, the DOS session must be dedicated to the Emulation Program. This is accomplished by running the GR5250.COM program in the DOS session. If you attempt to display graphics data before starting the GR5250.COM program in the DOS session, the Host Graphics session processing will be suspended, and a message screen entitled Host Graphics Support will appear.

This message screen informs you that GR5250.COM must be running in the DOS session before you can display any graphics data.

To run the GR5250.COM program:

1. Hot Key to the DOS session.

2. Type GR5250 at the DOS prompt.

3. Press the system unit ENTER key.

The GR5250.COM program will automatically return you to the Host Graphics session, and screen graphics data can now be displayed.

To free the Host Graphics session without displaying the graphics data:

1. Cancel the host job from the system console, or

2. Use the local select option mode in the Host Graphics session to terminate graphics.

Notes:

1. To remove the message screen from the display, you MUST use the terminate graphics function in local select option mode.

2. During termination, the host may send additional graphics data which must be terminated in the same way.

Operation if GR5250.COM is Running

The GR5250 program will continue to run in the DOS session until terminated. Any time you Hot Key to the DOS session while GR5250.COM is running, an option screen entitled GR5250 Enable Screen Graphics will appear.

This screen provides you with two options on how to proceed, and a brief explanation of each option. The options available to you are:

Option 1: Return to Host Graphics Session

Graphics screen data may be processed in the Host Graphics session. Select Option 1 to return to the Host Graphics session and display graphics data.

Option 2: Terminate GR5250 and return to DOS

If you wish to perform other tasks from the DOS session, you must first terminate GR5250.COM. Select Option 2 to terminate GR5250.COM and return to DOS.

Notes:

1. If GR5250.COM is terminated, graphics data can no longer be displayed in the Host Graphics session. The GR5250.COM program must be started again before any graphics data can be displayed.

2. The GR5250.COM program can remain running even if you are not currently displaying graphics data, and will not interfere with normal emulation function. However, GR5250.COM must be terminated if you wish to regain use of the DOS session.

3. The GR5250.COM program can be terminated and restarted as many times as necessary. You will be prompted each time the Host Graphics session tries to display graphics data and GR5250.COM is not running in the DOS session.

4. Hot Key continues to operate normally. You may Hot Key to any session without selecting an option.

Ending GR5250.COM

The GR5250.COM program can be terminated by selecting Option 2 from the GR5250 - Enable Screen graphics menu as described above. In addition, if the Emulation Program is terminated using the Alt-Ctl-Del key sequence, the GR5250.COM program will also be terminated.

Note: If the Alt-Ctl-Del key sequence is executed while the GR5250 - Enable Screen Graphics Menu is displayed, a complete IPL of the system unit is performed.

Printing the Screen During Emulation Mode

Printing on a Host System Printer

When the emulated Print key is pressed, a print request is sent to the host and your screen is printed or spooled by the host.

Printing on a System Unit Printer

When the emulated PrtSc key is pressed, your screen is printed on your system unit printer. EBCDIC codes below hex 20 are not translated. The codes below hex 20 are sent to the printer *as is*. Codes above 20 are translated using information provided in the Technical Reference manual. See the instructions for your printer to determine the action taken.

Notes:

1. If printer emulation is running, and using the same physical printer as the system unit, you must suspend the printer session from the emulated printer's operator panel before the system unit print screen function works (see "The Emulation Display" on page 6-4, for 5219 emulation, "The Emulation Display" on page 8-3, for 5256 emulation, or "The Emulation Display" on page 7-3, for 5224 emulation).

2. Printing of Graphics data is not supported while in Graphics mode. However, the emulated PrtSc key may be used to print alphameric information.

Leaving Emulation Mode

You can leave an emulation session by using one of the following sequences:

- Software reset (Ctrl - Alt - Del)

- Hot Key (default is Alt - Esc)

Using the Software Reset Sequence

CAUTION:

Do not use the software reset (Ctrl, Alt, and Del keys simultaneously) sequence to leave an emulation session while running an application on the system unit unless you have a sign-on screen in emulation mode. An error occurs causing the system unit to stop running. When this occurs, you must reload DOS and any other programs you want to have running.

The software reset sequence takes the display station offline from the host and returns the system unit to the DOS prompt. To the host, this is the same as turning off a 5250 display.

To terminate emulation mode:

- Sign off the host.

- When a host sign-on screen appears, press and hold the ALT and CTRL keys, then press DEL. This returns you to DOS. The system unit is offline. If you use the Hot Key sequence to enter PS/2 or personal computer mode instead of using the software reset sequence, memory space used by the Emulation Program may not be available for other application programs.

See "Loading the Programs" on page 3-1 and "Starting the Emulation Program" on page 3-6 if you want to reload the Emulation Program.

Using the Hot Key Sequence

After the Emulation Program has been loaded, the Hot Key sequence allows you to change sessions. By customizing the Hot Key sequence it is possible to go directly to a particular session (see the Technical Reference manual for additional information).

To leave emulation mode or to change emulation sessions, enter the Hot Key sequence. The emulated work station will remain online and the Emulation Program continues to run; however, the system unit no longer displays the same session.

To leave PS/2 or personal computer mode, enter the Hot Key sequence. The current program is *suspended* until you Hot Key back to that mode.

Notes:

1. It is possible that your system unit program may not allow itself to be interrupted. If this is true, let it run to completion before hot keying to an emulation session.

2. You can read the information from a session's screen and save it on a diskette. You may change the session that is selected to save screens. Refer to the Technical Reference manual for more information about this and other sample programs.

3. Any host-issued commands that cause the system unit to beep while the Emulation Program is online with the host continues to cause the unit to beep when it is in PS/2 or personal computer mode. This allows you to be aware of a host message or other event when you are not in emulation mode.

Chapter 4. Using the Display Screens

The 25-line display in emulation mode displays 24 lines of data.
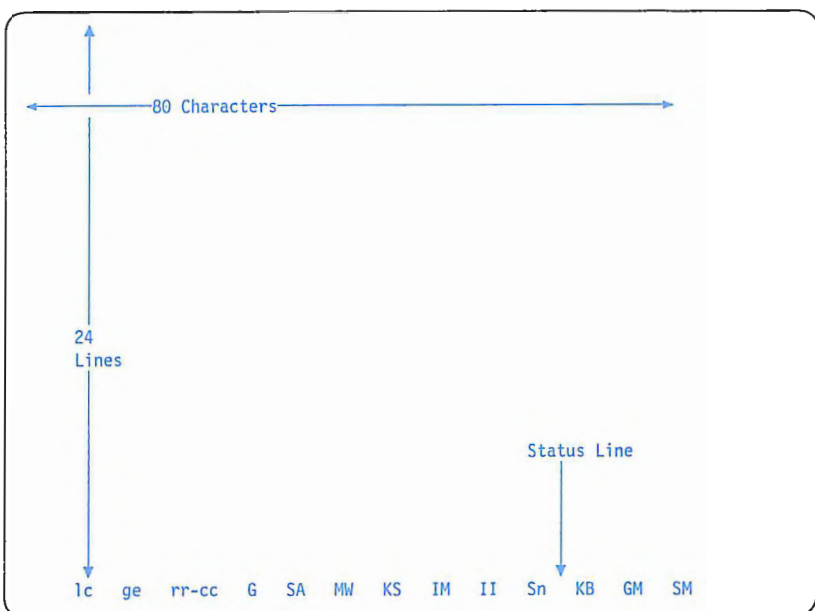Line 25 is the status line and displays the status of the host and
the system unit.

Figure   4-1. The Emulated 5250 Display Screen

Locating the Cursor

The status line of the system unit, when in emulation mode,
describes the location of the cursor. Figure 4-2 on page 4-2
shows where this information appears.

The cursor location is displayed on the status line as two 2-digit
numbers separated by a dash (the first two digits represent the

row that the cursor is in, and the second two digits represent the column).
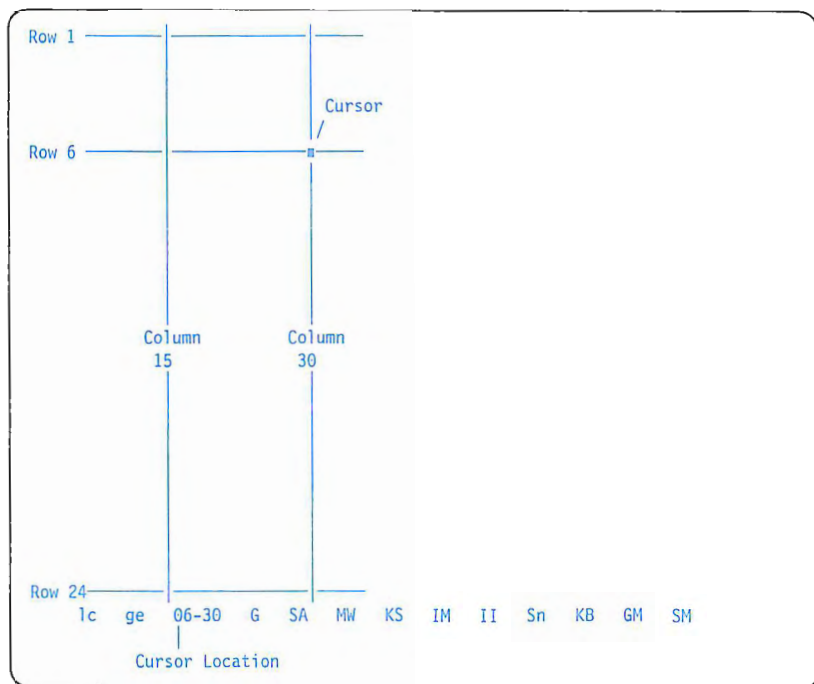
Figure   4-2. Cursor Location on Screen

For example:

The cursor in the illustration is in row **6** and column **30**.   This would be displayed on your status line as **06-30**.

Selecting the Cursor Style

The cursor blinks at all times on the system unit.   The cursor's attributes can be changed from a blinking rectangle to a blinking underscore to a blinking rectangle.   See the Technical Reference manual to identify the function that allows you to change the cursor style.

Notes:

1. The graphics cursor is an underscore and cannot be changed.

2. A fast-cursor option is available on some hosts by pressing a Shift key with a cursor movement key. This option only works if the cursor movement functions are assigned to the shifted mode of the cursor movement keys during keyboard customization.

Reversing the Display Screen

You can change the attributes (reverse the image) of the monochrome display from light characters on a dark background to dark characters on a light background. See the Technical Reference manual to identify the function that allows you to reverse the display image.

Note: The display image cannot be reversed in the graphics sessions.

Autodim Feature

The Autodim feature automatically dims the screen after a specified length of time if no keystrokes have been entered and no host-generated screen updates have occurred. During configuration, the 'Advanced Display Emulation Options Menu' allows you to enable Autodim and specify the length of time.

Understanding the Status Indicators

Status indicators are located on the status line (line 25) of the display screen when in emulation mode.

Status Line

lc   ge   rr-cc   G   SA   MW   KS   IM   II   Sn   KB   GM   SM

Figure   4-3. Status Indicators

The nine status indicators shown as capital letters appear either on or off. The indicators are on when a square block appears around the indicator (the indicators are in reverse image).

The status indicators are shown in the 5250 Emulation Program *Keyboard Templates* for quick reference.

Notes:

1. When operating in 40 column mode, MW, KS, and IM indicators are not shown.

2. Some of the indicators (such as the Ax indicator) are not normally seen on the status line.

The status indicators and their meanings are shown on the following pages.

Line Check Error (lc)

lc   The line check error indicates the number of unrecognizable types of data that have been received by the system unit. The count appears as a decimal number in columns 1 and 2 on the status line.

Note: This field is usually blank (no indicator appears). If a value appears in this field, see Appendix B,   Handling   Problem Determination.

Graphics Error Code (ge)

ge   The graphics error code displays a two-digit error code in columns 5 and 6. If the program is operating incorrectly, a two-digit error code is displayed. Refer to Appendix A, Handling Error Codes and Messages, for recovery information.

Notes:

1. This field is usually blank (no indicator appears).

2. A graphics error code may be cleared by pressing the emulated Error Reset key or by host system processing.

Cursor Location (rr-cc)

The cursor location appears on the status line as two-digit numbers separated by a dash (the first two digits represent the row that the cursor is on, and the second two digits represent the column).

For example, if the cursor is in row **6** and column **60**, this indicator reads **06-60**.

Graphics Display On (G)

G   The graphics display is on (screen in graphics state).

G   The graphics display is off (screen in alphameric state).

Note: This indicator is only used for host graphics support.

System Available (SA)

SA   The controller (5294 or 5394) and/or the host is operating and is available to the system unit.

SA   The host and/or controller is not available to the system unit.

Message Waiting (MW)

MW	The host has one or more messages for you. (You might hear a beep when the Message Waiting indicator first turns on.)
MW	The host does not have a message waiting for you.

Keyboard Shift (KS)

KS	The keyboard is in shifted mode.
	The KS indicator does not indicate when the keyboard is in Caps Lock or Num Lock mode. These modes are indicated by lights on the IBM Personal Computer AT keyboard and the Enhanced keyboard. They are not indicated on the keyboard used by the other IBM personal computers or the IBM Space Saving Keyboard.
KS	The keyboard is nonshifted mode.

Insert Mode (IM)

IM	Characters can be inserted into an existing field without destroying existing data.
IM	Characters cannot be inserted into an existing field without destroying data.

Input Inhibited (II)

II	Keyboard input is not being accepted by the host or the controller.
II	Keyboard input is being accepted by the host or the controller.

If the session has been configured for keystroke buffering and the II (Input Inhibited) indicator is on, keystrokes are saved and not sent to the host. When II is on, the only keystrokes sent to the host are Shift, emulated Error Reset, emulated Attention, emulated System Request, and emulated Help.

When the GM (Graphics Mode) or SM (Select Option Mode) indicators are on with the II indicator, the keyboard is inhibited but the keystrokes are not saved.

If keystrokes are saved, you may clear them by pressing the I Reset Key sequence. See "Special Key Sequences" on page 5-6 for the I Reset Key sequence.

The II indicator is turned on by the host system or by the controller while it is processing your requests. The II indicator is also turned on by error conditions.

The emulated Error Reset key may be used to turn the II indicator off, if it was turned on by an error condition.

Session Number (Sn)

Sn   The session number appears as an S followed by the number of the currently displayed session, for example **S1**.

Keystroke Buffering (KB)

KB   Keystrokes have been saved and are waiting for the input inhibited to clear so that they may be sent to the host. If keystrokes are saved, you may clear them by pressing the I **Reset Key** sequence. See "Special Key Sequences" on page 5-6 for the I Reset Key sequence.

KB   No keystrokes are being saved.

Note: The Keystroke Buffering indicator only appears during the sessions you configured for buffering. (See Chapter 10, "Advanced Configuration" on page 10-1 for information on running the configuration program to change keyboard buffering.)

Work Station Address (Ax)

Ax   The work station address is displayed to the right of the session number in the location normally used to indicate keystroke buffering (KB). Pressing the **WS Addr Key** sequence causes the address to appear. Pressing the **WS Addr Key** sequence again returns the KB indicator (may be blank if keyboard buffering is not active) to the status line. See "Special Key Sequences" on page 5-6 for the WS Addr Key sequence.

Graphics Mode (GM)

GM   The work station is in graphics mode.

GM   The work station is not in graphics mode.

When this indicator is on, the system unit is processing or waiting to process graphics data.

Note: This indicator is only used for host graphics support.

Select Option Mode (SM)

SM   The keyboard is in select option mode.

SM   The keyboard is not in select option mode.

See "Select Options Mode" on page 5-4 for additional information.

Note: This indicator is only used for host graphics support.

Display Highlighting

See the Technical Reference manual for a detailed description of the types of highlighting available for PS/2 and personal computer displays (compared with the 5250 displays) as used in the Emulation Program.

IBM PS/2 and Personal Computer Monochrome Display

The Emulation Program with the Monochrome Display Adapter can display characters that are normal intensity, high intensity, blinking, reverse image, or underscored. It does not provide characters that are in reverse image with underscore (it displays normal image with underscore) or reverse image with high intensity (it displays reverse image with normal intensity).

Note: The highlighting for the Monochrome Display may be changed by using the configuration program.

The Emulation Program does not support column separators in the same way as a 5250 Display Station. A PS/2 or personal computer character, to be used for the column separator, may be selected when the configuration program is executed. You may also specify if the character should appear when the field contains only a null character, or when the field contains either a blank or null character.

If you do not select a character as the column separator, a rectangle (█) will appear in the separator position when it contains a null character.

Note: Column separators are not supported in graphics mode.

The IBM 8507 Monochrome Monitor requires display attributes to be changed by the configuration program (CONFIG). Otherwise the screen will appear dim when emulation is loaded. The display option can be changed at the Advanced Display Emulation Options Menu during CONFIG. Refer to Chapter 10, for more information. To prevent dimming on the 8507, change the following screen attributes:

Enter **0F** for attribute 20.

Enter **70** for attribute 21.

Enter **7F** for attribute 22.

Enter **0F** for attribute 30.

IBM PS/2 and Personal Computer Color Display and Portable Display

Characters are displayed in normal intensity, high intensity, blinking, and reverse image when using the Emulation Program on the following displays:

- IBM PS/2 Color Display

- IBM Personal Computer Color Display

- Portable Display

The underscore is program dependent. If the program uses hex 00 in the data area of an underscored field, an underscore is simulated. If the host uses hex 40 (blank) in the data area, the underscore cannot be simulated (the character appears without an underscore).

Notes:

1. The highlighting for a color display may be changed by using the configuration program.

2. A display that uses the Color Graphics Adapter, but is identified as a single-color display or an IBM Portable Personal Computer display during configuration, may not have its attribute table changed.

The Emulation Program does not support column separators in the same way as a 5250 Display Station. A PS/2 or personal computer character, to be used for the column separator, may be selected when the configuration program is executed. You may also specify if the character should appear when the field contains only a null character, or when the field contains either a blank or null character.

If you do not select a character as the column separator, a rectangle (▐) will appear in the separator position when it contains a null character.

Note: Column separators, blink, and underscore are not supported in graphics mode.

Operators using the IBM Portable Personal Computer or a single-color monitor with a Color Graphics Adapter can set the

correct display mode for the emulation sessions by using the CONFIG.EXE utility as follows:

1. Select the Advanced Display Emulation Options on the Advanced Options Menu.

2. Select Monitor Types for Color Graphics Adapter option.

3. Indicate your monitor type.

4. Return to the Advanced Display Emulation Options Menu.

5. Save the profile data.

The Emulation Program sets the display attributes and mode based on the profile data.

Notes:

1. Occasionally, a brief flash of unreadable characters may appear on the screen during graphics processing. This is a temporary condition, and does not affect operation of either the Emulator or Host Graphics support.

2. Under some conditions, a polygon may become too complex to fill. At this point, the local error L3 is posted on the status line, the fill mode is set to HOLLOW, and graphics processing continues.

3. When a display adapter/monitor combination that supports fewer than 8 screen colors is used, the screen may flash in different colors during graphics processing. This is a result of having too few colors during color table mapping, and does not affect operation of either the Emulator or Host Graphics processing.

Chapter 5. Using the Keyboard

When the PS/2 and personal computer emulate an IBM 5250 Display Station, the keyboards are not exactly the same.

Keyboard definition files, included with the 5250 Emulation Program Diskette, allow you to choose whether your keyboard acts like a PS/2 keyboard, a personal computer keyboard, or a 5250 style keyboard. The key assignments are located as close to the *normal* key position as practical for each keyboard style. You may use one of these files, or you may define your own (see the Technical Reference manual for instructions on defining a keyboard).

The PS/2 and personal computer style keyboard profiles provided on the Emulation Program diskette do not contain the following 5250 functions:

- Cmd key
- Cursor style
- Hex
- Reverse image

These functions may be assigned to a keyboard key. See the Technical Reference manual for help with customization.

If a customized keyboard is not specified, the program uses KB5250.PRO as the default keyboard. This is the file that describes the 5250 style keyboard. If this file is not available, an error message is displayed. If an error is found in a keyboard customization file when the program is started, an error message is displayed and control is returned to DOS.

The names of the files that describe the 5250 style keyboards are:

- KB5250.PRO
- KBA5250.PRO.

The names of the files that describe the PS/2 and personal computer-style keyboards are:

- KBPC.PRO
- KBAPC.PRO
- KBEPC.PRO.

Figure 5-1 lists the names of the files that can be specified for each personal computer style keyboard.

Figure 5-1. PS/2 and Personal Computer Style Keyboards	
System Unit Keyboard	**Profile Name**
IBM PC, PC-XT, Portable PC	KBPC.PRO or KB5250.PRO
IBM PC-AT	KBAPC.PRO or KBA5250.PRO
IBM Enhanced, IBM Space Saving	KBEPC.PRO

You may also use a customized profile that you design. To develop a customized file, use an editor and change one of the files just mentioned or create a file of your own.

Keyboard Modes

The keyboard mode controls the characters or functions desired when pressing a given key. The keyboard is used in four different modes:

- Alternative shift mode
- Shifted mode
    - Shift key held affects all keys
    - Caps Lock state affects only alphabetic keys
    - Num Lock state affects only numeric pad keys
    - Shift Lock state affects alphabetic and special character keys
- Nonshifted mode

- Select option mode (graphics session only).

For example, on the Personal Computer style keyboard:

Keyboard Mode	Ctrl Key Functions
Alternative	Sta Addr
Shifted (shift key held)	Sys Req
Nonshifted (In Caps Lock state or in Shift Lock state and Shift key not held)	Attn
Select option	Sounds the alarm

The functions of the keys in any keyboard mode can be identi-
fied by looking at the keyboard template for the style of key-
board you are using.

Nonshifted Mode

The nonshifted mode is the normal mode of a keyboard. As with
a typewriter, when the Shift key is not pressed, the caps lock
and shift lock functions are not active. In this mode, pressing
the a key displays an a.

Shifted Mode

The shifted mode is the mode of a keyboard when the Shift key
is held down or when an emulated shift lock function is active.
As with a typewriter, when the Shift key is pressed or the shift
lock is active, pressing the a key displays an A.

Caps Lock State

In the caps lock state only the alphabetic characters enter uppercase characters. This state remains in effect during all emulated sessions and when in PS/2 or personal computer mode. The indicator on the IBM Personal Computer AT keyboard is on when the caps lock state is in effect.

Shift Lock State

In the shift lock state the entire keyboard enters uppercase alphabetic characters and the shifted characters on special character keys.

Num Lock State

The function or character assigned to the shifted state on the numeric keyboard is performed. This state remains in effect during all emulated sessions and when in PS/2 or personal computer mode. The indicator on the following keyboards is on when the Num Lock state is in effect:

- IBM Enhanced keyboard

- IBM Personal Computer AT keyboard

Alternative Shift Mode

The alternative shift mode is the mode of a keyboard when the Alt key is held down. Like a Shift key, the Alt key provides another *level of shift* for the keyboard.

Select Options Mode

The select options mode allows the operator to control the graphics display from the keyboard. The keyboard is in select options mode when SM is shown in reverse image on the status line. Except for the key sequences identified in Figure 5-2 on page 5-5, the keyboard is inhibited during this mode. Pressing inhibited keys causes the alarm to sound.

Figure 5-2. Select Options Mode Key Sequences	
Key Sequence	**Description**
Emulated Cmd and Reset	Display enters select options mode.
Emulated Error Reset	Cancel select option mode.
Emulated alpha 1 key (not num pad 1)	Graphics display on or off. Toggles the current state of the graphics display. This selection is always accepted. The Graphics indicator (G) is on (shown in reverse image), when the graphics display is on.
Emulated alpha 2 key (not num pad 2)	Turn status line on or off. Toggles the current state of the graphics status line. This selection is accepted at any time, but is effective only when the Graphics indicator (G) is on (shown in reverse image).
Emulated alpha 3 key (not num pad 3)	Aspect ratio key. Pressing this key adjusts (changes the aspect ratio) the data for the differences in screen sizes. Pressing it again returns the data to its normal aspect ratio.
Emulated alpha 9 key (not num pad 9)	Erases the graphics display. This selection is only accepted when the display is not in graphics mode (GM indicator is shown in the normal image).
Emulated alpha 0 key (not num pad 0)	**CAUTION:** **This key sequence may cause unpredictable results.** Terminates graphics processing. This selection is only accepted during graphics mode (GM indicator shown in reverse image).

Special Key Sequences

Hot Key Sequence

The Hot Key sequence is used to change sessions. Each time
the emulated Hot Key sequence is pressed, the session is
changed to the requested session or to the next session in the
defined rotation. An example of that rotation is shown in
Figure 5-3. Each time the emulated Hot Key sequence is
pressed, the display shows the next session. The default Hot
Key sequence is Alt-Esc. By using keyboard customization it is
possible to go directly to a desired session. (See the Technical
Reference manual for further information.)

Notes:

1. Occasionally, when the emulated Hot Key sequence is
   entered, the request may not be accepted. Reenter the
   sequence until your request is accepted.

2. After a Hot Key, all keys used in the Hot Key sequence must
   be released before another Hot Key can be attempted.

3. You should be aware that any key sequence you assign in a
   keyboard customization profile to hot key from the DOS
   session is not available for use in a DOS application
   program. The hot key sequence is detected by the Emu-
   lation Program and the keys are not passed on to the DOS
   application.

```
  ┌─FIRST SESSION──►(Hot Key)──LAST SESSION─┐
  │                                          │
  ▲                                          ▼
  │                                          │
  └──(Hot Key)◄────PC MODE◄────(Hot Key)─────┘
```
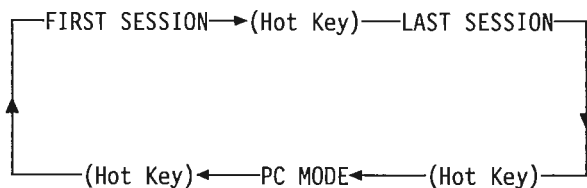
Figure 5-3. Hot Key Session Rotation

Note: It is possible that your PS/2 or personal computer
program may not allow itself to be interrupted. If this is

true, you should let it run to completion before hot keying to an emulation session.

Immediate Reset Key Sequence

The Immediate Reset (I Reset) Key sequence is used to clear the keystroke buffer and to stop the playback of any defined key sequences. I Reset also clears any Shift Lock or Insert mode states that are in effect. To enter the I Reset Key sequence, press and hold the ALT key and then press the SCROLL LOCK Key.

Work Station Address Key Sequence

The Work Station Address (WS Addr) Key sequence is used to display the 5250 work station address for the current emulated session. To enter the WS Addr Key sequence, press and hold the ALT key and then press the CTRL key. The address is displayed to the right of the session number in the location normally used to indicate keystroke buffering (KB). Entering the WS Addr Key sequence again returns the KB indicator to the status line. The KB indicator may be blank if keyboard buffering is not active.

Select Options Mode Key Sequence

The Select Options Mode key sequence is used to go into Select Options Mode.

Before you can use this feature (when using a PS/2 or personal computer style Keyboard) you must define a Cmd Key. See "Customizing the Keyboard" in the Technical Reference manual for information on defining Keyboards.

Press and hold the CMD key, then press the emulated ERROR RESET key.

Using the Shift Lock Functions

Emulating Shift Lock Key

When operating with the 5250 style keyboards, the shift lock function uses the Ctrl key to emulate a Shift Lock key. When you press the Ctrl key, the uppercase alphabetic characters (A through Z) and the special characters (like the @ symbol) are entered, but the function keys continue to use the functions assigned to the nonshifted mode. See "Entering the Keyboard Functions" on page 5-9 for additional information.

Using the Caps Lock and Num Lock Keys

When operating with the PS/2 or personal computer style keyboards, the Caps Lock and the Num Lock keys operate the same as in PS/2 or personal computer mode. Pressing the keys in any of the sessions, including the DOS session, sets the state in all sessions. The states of the Caps Lock and Num Lock keys are indicated on the Personal Computer AT keyboard and the Enhanced keyboard. Neither Caps Lock nor Num Lock may be used in a playback sequence.

When in Caps Lock, the uppercase characters (A through Z) and the lowercase special characters (like the number 2) are entered, and the function keys continue to use the functions assigned to the nonshifted mode. Caps Lock does not cause the KS indicator to come on. The Caps Lock function can only be assigned to the Caps Lock key.

When in Num Lock, the characters or functions assigned to the shifted mode of the numeric pad are entered. Num Lock does not cause the KS indicator to come on. The Num Lock function can only be assigned to the Num Lock key.

When operating with the 5250 style keyboard (where Caps Lock and Num Lock functions are not defined), the indicators on the IBM Personal Computer AT keyboard and Enhanced keyboard only indicate the state of those keys when in the DOS session.

See "Entering the Keyboard Functions" on page 5-9 for additional information.

Entering the Keyboard Functions

When a key is pressed in the shifted mode, the character or function defined to the "s-" (shifted) mode of the key is entered. When a key is pressed in the alternative shift mode, the character or function defined to the "a-" (alternative shift) mode of the key is entered.

For example, if you made the following definitions in the keyboard customization file:

```
def 1 = '1'
def s-1 = '!'
def Ctrl = [attn]
def s-Ctrl = [sys req]
```

when a 5250 style keyboard is in the shifted mode (shift key held down or keyboard in emulated shift lock state) and the 1 key is pressed, the ! is entered since ! is a 5250 defined character.

Keys defined to perform functions when in the shifted state perform those functions only when the Shift key is held down or the key is on the numeric pad and the keyboard is in the Num Lock state. For example, with the above key definitions, when Ctrl (the emulated Attn key) is pressed, the attention function is requested of the host system when the keyboard is in the non-shifted state. To use the system request function, you may press Ctrl (the emulated Sys Req key) while a Shift key is held down.

When a PS/2 or personal computer style keyboard is in the caps lock state, an **a** is entered as an **A**, however a **1** is entered as a **1** since these are the system unit defined characters.

Keys defined to perform functions when in the shifted state must have the Shift key held down even when the keyboard is in caps lock state. For example, with the above key definitions, when Ctrl (the emulated Attn key) is pressed, the attention function is requested of the host system whether or not you are in caps

lock state. To use the system request function, you must press CTRL (the emulated Sys Req key) while a Shift key is held down.

Keystroke Buffer

CAUTION:
Keystroke buffering while the GM or SM indicators are on may cause unpredictable results.

If keystroke buffering is configured for a session and the Input Inhibited (II) indicator is on, keystrokes (up to 32) are stored and then sent to the host when the Input Inhibited indicator is off. If more than 32 keys are pressed, an alarm is sounded for each key and the keystroke is discarded. As the buffer space is freed, when keystrokes are sent to the host, additional keystrokes may be buffered.

See "Keystroke Buffering (KB)" on page 4-7 for a description of the Keystroke Buffer indicator.

If keystrokes have been stored and you want to cancel them, do one of the following:

• Press and release the emulated ERROR RESET key.

• Press and hold the I Reset Key sequence. This method also stops any playback sequence that is in progress.

The stored keystrokes are removed from the keystroke buffer, an emulated Error Reset is sent to the host, and Shift Lock and Insert states are cleared.

Note: While running 3270 emulation on the IBM host, the Input Inhibited indicator may be cleared when the system is not ready to accept keystrokes. Clearing Input Inhibited may cause buffered keystrokes to be discarded. Care should be taken when buffering keystrokes for use during 3270 emulation.

Using Keyboard Templates

Keyboard templates are provided for each of the default keyboard definitions, and blank templates are provided to assist you with the operation of your customized keyboard. Figure 5-4 identifies the templates and files to be used with each of the defined keyboards. The keyboard template may be placed at the top of the keyboard as a reminder of the emulated key placement.

Figure 5-4. Keyboard Templates			
Keyboard Profile	Keyboard Style	Keyboard Template Name	System Unit
KBPC.PRO	PC	5250 Emulated in PC Style on a PC Keyboard	PC, PC XT, or Portable PC
KBAPC.PRO	AT	5250 Emulated in AT Style on an AT Keyboard	AT
KBEPC.PRO	EN	5250 Emulation in PC Style on an Enhanced Keyboard or Space Saving Keyboard	AT, PS/2, or PC XT 286
KB5250.PRO	PC	5250 Emulated in 5250 Style on a PC Keyboard	PC, PC XT, or Portable PC
KBA5250.PRO	AT	5250 Emulated in 5250 Style on an AT Keyboard	AT

Note: Additional templates are provided for Select Option Mode on the system unit keyboards. A template defining the status indicators that appear on the display screen when in emulation mode is also provided.

Entering Key Strings

CAUTION:
The playback of a string, as defined in a 5250 emulated session, may cause unpredictable results while the GM or SM indicators are on (GM or SM shown in reverse image).

The keyboard customization file allows you to assign a string of characters and functions, such as *Have a nice day*, to the alternative shift mode of a single key.

A key that does not have a string assigned to its alternative shift mode does not cause any action to occur when used in alternative shift mode. This also clears the keystroke buffer.

Notes:

1. Multiple keystroke sequences may only be assigned during keyboard customization. See the Technical Reference manual for additional information about customizing your keyboard.

2. The maximum number of keystrokes that may be entered in any one string or in all combined strings is 510.

3. You should not assign strings, such as security code strings, that you do not want displayed. These strings can be played back in a displayable field.

4. While running 3270 emulation on the IBM host, the Input Inhibited indicator may be cleared when the system is not ready to accept keystrokes. Clearing Input Inhibited may cause playback sequence keys to be discarded. Care should be taken when defining playback sequences for use during 3270 emulation.

Chapter 6. Emulating an IBM 5219 Printer

The following personal computer printers are capable of emulating the 5219 Printer:

- IBM 3812 Pageprinter using supplied PFT

- IBM 5182 Color Printer

- IBM 5201 Quietwriter

- IBM 5202 Quietwriter III using supplied PFT

- IBM 5204 Quickwriter using supplied PFT

- IBM 5216 Wheelprinter

- HP LaserJet Series II printer using supplied PFT

- User-defined printer

Introducing 5219 Emulation

One of the above printers can be used to emulate the IBM 5219 Printer when the second session of the Emulation Program is configured for 5219 printer emulation. Any printer capable of emulating a 5219 may be attached. However, functions not available on the 5219 are not supported, even though the attached printer may support them.

For example, a 3812 emulating the 5219 is different from a 3812 directly attached to the host. This means that 3812 functions such as bold printing and the Set Text Orientation command are not supported.

Notes:

1. The keyboard customization file in effect for the display emulation session is also in effect for printer emulation.

2. Printer emulation continues when in PS/2 or personal computer mode. If the printer is used in PS/2 or personal computer mode, printer emulation must be suspended before leaving the printer emulation session.

The IBM 5219 printer emulation uses information from the configuration profile. See "Configuring for Emulation" on page 2-18 for further information. Refer to the Technical Reference manual for command descriptions used to control the 5219.

The PS/2 and personal computer display screens emulate the IBM 5219 printer's operator panel while in IBM 5219 printer emulation mode.

Considerations for Using the HP LaserJet Series II Printer

The HP LaserJet Series II printer uses an IBM supplied Printer Function Table (PFT). The following apply when using this PFT:

- Superscript and subscript will only work with a line density of 6 lines per inch.

- Proportional space fonts will not print correctly when text is underlined or overstriked.

- Justification when using proportional spaced fonts is not supported.

- Tabs when using proportional spaced fonts are not supported.

- Mid-line type style changes when either of the type styles is typographic will not print correctly.

- The symbol set used is the Roman 8 character set.

- Bold print and set text orientation (rotate page) are not supported.

Setting Up the Printer

The Emulation Program sets up the attached system unit printer according to options chosen during configuration. The type of paper feed the printer can use, paper width, form feed, and font change without user intervention can be specified. (See "Advanced Printer Options" on page 10-6 for more information.)

Each defined printer session requires a separate printer. You are responsible for ensuring that the physical paper handling equipment matches what was specified during configuration.

Automatic Cut Sheet Feed Handling Device

An IBM 5219 Printer initializes the paper feed technique of the Set Print SetUp (SPSU) control to whatever paper feed hardware is electrically connected to the 5219 Printer. 5219 emulation initializes the paper feed technique to the first paper feed type specified in the host print job.

Refer to the printer operator's manual when physically setting up the cut sheet feed handling device.

If an IBM 5216 Wheelprinter is attached, the Paper Feed Toggle switch must be set for the desired sheet feed method.

Serial Printer Limitations

If you will be using a serial printer, you should be aware of the following limitations:

- No other communications adapters (SDLC, BSCA, etc.) may be used concurrently in the PS/2 or personal computer.

- Only one Asynchronous Communications Adapter may be in use in the system unit.

- The printer emulation code cannot detect "Printer Off Line" or "Paper End" conditions in the serial printer. The printer Emulation Program will try to transmit data to the printer until all data has been successfully transmitted. Printer

emulation will indicate "Printer Off Line" if either condition occurs.

- Baud rate is limited to a maximum of 4800 when running on the IBM Personal Computer, the IBM Portable Personal Computer, or the IBM Personal Computer XT. It is your responsibility to make sure this rate is not exceeded.

  If, during initialization, the printer Emulation Program detects that this limitation has been exceeded, the selected baud rate will be overridden to 4800 baud and unexpected results may occur.

The Emulation Display

The options and indicators are shown in Figure 6-1.

```
              5219 PRINTER EMULATION - OPERATOR SCREEN


    OPTION MENU:                        INDICATORS:

 1   Start                            Ready
 2   Stop
 3   Suspend                          Printer Exception
 4   Cancel
                                      End Of Forms

 Output Data  =  [   ]                Change Setup

                                      Change Font

 SELECT OPTION    _                   System Available




                                                          S2
```

Figure 6-1. The IBM 5219 Printer Options

Using the Emulated Printer Options

The printer options screen emulates the Start, Stop, and Cancel operator panel switches and uses the following options:

- Start

- Stop

- Suspend

- Cancel

These options are selected from the 5219 Printer Options screen and are entered by pressing the associated number and then pressing ENTER.

Note: Before turning off your system unit, you must suspend printer emulation.

Start Option

Selecting the Start option while the Ready indicator is on performs no function since its intended function is to make the printer Emulation Program ready.

If the Ready indicator is off when the Start option is selected, the result depends on the condition of the printer Emulation Program as shown in Figure 6-2 on page 6-6.

Figure 6-2. Start Option	
Condition	**Result**
Emulation Program was just loaded and no error conditions exist.	Turns the Ready indicator on.
Printer Emulation Program has been halted by the Stop option.	Turns the Ready indicator on and allows printing to continue.
Printer Emulation Program has been halted by the Suspend option.	Turns the Ready indicator on, returns printer control to the printer Emulation Program, restores the printer to the state it was in at the time the Suspend option was selected, and allows printing to continue. The current print line becomes the logical top of the page.

Stop Option

Selecting the Stop option while the Ready indicator is on causes the Ready indicator to be turned off. The printer continues printing until its buffer is empty. The printer Emulation Program does not process any further data or commands from the host until the Start option is selected.

This option is intended to temporarily halt printing to allow adjustments to the printer, such as changing paper.

Suspend Option

Selecting the Suspend option while the Ready indicator is on causes the Ready indicator to be turned off and all information in the printer's print buffer to be printed. No further host data or commands are processed by the printer Emulation Program.

In addition, the current status of the emulated 5219 printer is saved, the forms advance to the first print line of a new page,

the system unit is initialized to its power-on state, and all oper-
ator panel options except Start are disabled. This option allows
the operator to free the printer from the host and make it avail-
able to the system unit. Use the Hot Key sequence to go to PS/2
or personal computer mode.

After the Hot Key sequence, the operator can move the forms to
any desired position and use the printer for any system unit
printing. When finished, the operator should position the forms
to the first print line of a new page.

The option is accepted regardless of the state of the Ready indi-
cator.

Note: This option is necessary only if the PS/2 or personal
computer application program uses the same printer
device name (LPT1, LPT2, and so on) as the Emulation
Program (selected via the configuration program). If the
application program is using a different printer, then the
Emulation Program can print at the same time as the
application program without being suspended.

Cancel Option

Selecting the Cancel option causes the host to be notified of the
cancel request.

This option is accepted regardless of the state of the Ready indi-
cator.

Output Data Field

The output data field is used to provide control and diagnostic
information to the operator. See "Output Data Field Values
(5219 and 5224 Printer Emulation)" on page A-23 for further
information.

Status Indicators

The operator panel emulates the following status indicators:

- Ready
- Printer Exception
- Forms
- Change Setup
- Change Font
- System Available

When an emulated indicator is on, it appears in reverse image on the options screen.

Ready Indicator

The Ready indicator is turned on by selecting the Start option or by receiving a Set Mode command from the host when the printer is online. Whenever the indicator is on, the printer Emulation Program is ready to process host data and the printer is ready to receive the data.

The Ready indicator is turned off by one of the following:

- Change font request
- Change setup request
- Reset command from the host
- End of forms condition
- Printer exception
- Data transfer error.

ᵔn turn it off by selecting the Stop or Suspend option.

Printer Exception Indicator

The Printer Exception indicator turns on when a data stream exception is detected. The 2-digit code that appears in the output data field defines the exception. See Appendix A, Handling Error Codes and Messages, for a description of the codes.

Forms Indicator

The Forms indicator is turned on when either an automatic sheet feed drawer is empty or the printer is out of continuous forms.

See the appropriate printer operator's guide for paper handling procedures. The printer Emulation Program must be made ready by selecting the Start option to continue printing.

Change Setup Indicator

The Change Setup indicator is turned on when a request is received to change the paper feed method. The 2-digit code that appears in the output data field describes the paper feed mechanism requested. See Appendix A, Handling Error Codes and Messages, for the description of the codes. See the operator's guide for your printer to change the paper feed hardware.

Change Font Indicator

The Change Font indicator is turned on when a request is received to change the font. The 2-digit code that appears in the output data field describes the requested font. See Appendix A, Handling Error Codes and Messages, for the description of the codes.

Note: This indicator is not used with a printer that can change fonts without user interventions (specified when you configure advanced printer options).

System Available Indicator

The System Available indicator is turned on whenever a printer command other than a Reset command is received from the host.

This indicator is turned off when communication with the host stops.

Printer Session Number (Sn)

The printer session number appears on line 25 as Sn (where n is the number of the session).

Work Station Address (Ax)

The printer work station address is displayed on the emulated control panel. Pressing the WS Addr key sequence again removes the address from the emulated control panel.

User-Defined Printer

The Emulation Program allows you to make a non-supported printer class known to the program. To do this, you create a printer function table that the Emulation Program uses to convert controls into the escape sequences, controls, and graphics understood by the printer.

See "Using the Print Function Table Setup Program" in the Technical Reference manual for help in creating printer function tables.

Chapter 7. Emulating an IBM 5224 Printer

The following printers are capable of emulating the 5224 or 5225 printers:

- IBM 5152 Matrix Printer (Model 001)

- IBM 5152 Graphics Printer (Model 002)

- IBM 5201 Quietwriter Printer

- IBM 5182 Color Printer

- IBM 5216 Wheelprinter

- IBM 4201 Proprinter

- IBM 4202 Proprinter XL using supplied PFT

- IBM 4207 Proprinter X24

- IBM 4208 Proprinter XL24 using supplied PFT

- IBM 3812 Pageprinter using supplied PFT

- User-defined printer

Note: All information in this chapter concerning the 5224 printer is applicable to the 5225 printer.

Introducing 5224 Emulation

One of the above printers can be used to emulate the IBM 5224 Matrix Printer when the second session of the Emulation Program is configured for 5224 printer emulation. Any printer capable of emulating a 5224 may be attached. However, functions not available on the 5224 are not supported, even though the attached printer may support them.

For example, a 3812 emulating the 5224 is different from a 3812 directly attached to the host. This means that 3812 functions

such as bold printing and the Set Text Orientation command are not supported.

Notes:

1. The keyboard customization file in effect for the display emulation session is also in effect for printer emulation.

2. Printer emulation continues when in PS/2 or personal computer mode unless the printer session has been suspended prior to entering that mode.

3. Transparent mode or Buffer Print is not supported with the Emulation Program.

4. Load Alternate Character (LAC) is not supported with the Emulation Program. This means that the System/36 5224 Advanced Printer Function licensed program is not supported.

The IBM 5224 Printer Emulation uses a configuration profile. (See "Configuring for Emulation" on page 2-18 for further information.)

The PS/2 and personal computer display screen emulate the IBM 5224 printer's operator panel in printer emulation mode. See the Technical Reference for commands to control the 5224 printer.

Serial Printer Limitations

If you will be using a serial printer, you should be aware of the following limitations:

- No other communications adapters (SDLC, BSCA, etc.) may be used concurrently in the system unit.

- Only one Asynchronous Communications Adapter may be in use in the system unit.

- The printer emulation code cannot detect "Printer Off Line" or "Paper End" conditions in the serial printer. The printer Emulation Program will try to transmit data to the printer until all data has been successfully transmitted. Printer

emulation will indicate Printer Off Line if either condition occurs.

- Baud rate is limited to a maximum of 4800 when running on the IBM Personal Computer, the IBM Portable Personal Computer, or the IBM Personal Computer XT. It is your responsibility to make sure this rate is not exceeded.

  If, during initialization, the printer Emulation Program detects that this limitation has been exceeded, the selected baud rate will be overridden to 4800 baud and unexpected results may occur.

Setting Up the Printer

The Emulation Program sets up the attached system unit printer according to options chosen during configuration. LPI, CPI, paper width, form feed, and font changes without user intervention can be specified. (See "Advanced Printer Options" on page 10-6 for more information.)

Each defined printer session requires a separate printer.

The Emulation Display

The options and indicators appear as follows:

```
        5224 PRINTER EMULATION - OPERATOR SCREEN


  OPTION MENU:                              INDICATORS:

  1  Start                                  Ready
  2  Stop/Reset
  3  Suspend                                Attention
  4  Cancel
  5  Line Feed                              Forms
  6  Form Feed
  7  Select Printer Parameters             Graphic Check

  Output data  (    )                       Change Font

  SELECT OPTION    _                        System Available




                                           S2
```

Figure   7-1. The IBM 5224 Printer Operator Panel

Using the Emulated Printer Options

The printer options screen emulates the following operator switches:

- Start

- Stop/Reset

- Suspend

- Cancel

- Line Feed

- Form Feed

- Select Printer Parameters

These switches are selected as options from the 5224 Printer options screen and are entered by pressing the associated number and then pressing ENTER.

Start Option

Selecting the Start option while the Ready indicator is on performs no function since its intended function is to make the printer ready.

If the Ready indicator is off when the Start option is selected, the result depends on the condition of the printer emulation routine as shown in Figure 7-2.

Figure 7-2. Start Option

Condition	Result
Emulation Program just loaded and no error conditions exist.	Turns the Ready indicator on.
Printer Emulation Program has just been halted by the Stop/Reset option, or the Stop/Reset option was just used to reset an error condition.	Turns the Ready indicator on and continues printing.
Printer Emulation Program has just been halted by the Suspend option.	Turns the Ready indicator on, returns system unit printer control to 5224 printer emulation, restores the printer to the state it was in at the time the Suspend option was selected, and continues printing. The current print line becomes the logical top of page.

Stop/Reset Option

Selecting the Stop/Reset option while the Ready indicator is on causes the Ready indicator to be turned off. The printer continues printing until its buffer is empty. The Emulation Program does not process any further commands from the host until the Start option is selected.

If this option is selected when the Ready indicator is off, it functions as a Reset key.

This option is intended to temporarily halt printing and allow adjustments to the printer, such as changing paper.

Suspend Option

Selecting Suspend while the Ready indicator is on causes the Ready indicator to be turned off and all information in the printer's print buffer to be printed. The Emulation Program does not process any further data or commands from the host.

In addition:

- The current status of the emulated 5224 printer is saved.

- The forms advance to the first print line of a new page.

- The printer enters its initialized state (Ready and Online).

- All operator panel options except Start are disabled.

This option allows the operator to free the printer from the host and make it available to the system unit. Use the Hot Key sequence to go to PS/2 or personal computer mode.

After the Hot Key sequence, the operator can move the forms to any desired position and use the printer for any system unit printing. When finished, the operator should position the forms to the first print line of a new page.

The Suspend option is accepted regardless of the state of the Ready indicator.

Note: This option is necessary only if the application program uses the same printer device name (LPT1, LPT2, and so

on) as the Emulation Program (selected via the config-
uration program). If the application program is using a
different printer, then the Emulation Program can print at
the same time as the application program without being
suspended.

Cancel Option

Selecting the Cancel option causes the host to be notified of the
cancel request.

Line Feed Option

Selecting the Line Feed option when the Ready indicator is off
advances the forms to the next print line.

The Line Feed option is ignored when the Ready indicator is on.

Form Feed Option

Selecting the Form Feed option when the Ready indicator is off
advances the forms to the first print line of the next form.

The Form Feed option is ignored when the Ready indicator is
on.

Note: The operation of this option depends on previous com-
mands to the printer. That is, the form length assigned
by the host program must be the same as the actual
length of the form.

Printer Parameters

The printer parameters appear as shown in Figure 7-3 on
page 7-8.

```
   ┌─────────────────────────────────────────────────────────────
   │          5224 PRINTER EMULATION - PRINTER PARAMETERS
   │
   │   SELECT LINES PER INCH (LPI)
   │
   │      1  6 LPI       [ACTIVE]
   │      2  8 LPI
   │
   │
   │   SELECT CHARACTERS PER INCH (CPI)
   │
   │      3  Normal (10 CPI)
   │      4  Compressed (15 CPI)      [ACTIVE]
   │
   │
   │      5  Return to Operator Panel
   │
   │   SELECT OPTION        _
   │
   │    OPERATOR MESSAGE FIELD                          S2
   │
   └─────────────────────────────────────────────────────────────
```

Figure   7-3. The Emulated IBM 5224 Printer Parameters

Lines Per Inch (LPI)

6 LPI Option

Selecting 6 LPI (lines per inch) causes the printer to print six
lines of text per inch of page length.

8 LPI Option

Selecting 8 LPI (lines per inch) causes the printer to print eight
lines of text per inch of page length.

Note: The current line spacing option is indicated with the word
ACTIVE appearing next to the option selected.

10 CPI Option

Selecting 10 CPI (characters per inch) causes the printer to print 10 characters per inch. If the attached printer has an eight inch paper width, and if more than 80 characters are formatted for a line, the extra characters are printed on the following line.

15 CPI Option

Selecting 15 CPI causes the printer to print 15 characters per inch (compressed print). When the attached printer has an eight inch paper width, this option allows 132 characters to be printed on a line.

Note: The current character spacing option is indicated with the word ACTIVE appearing next to the options selected.

Output Data Field

The Output Data field provides control and diagnostic information to operators. See "Output Data Field Values (5219 and 5224 Printer Emulation)" on page A-23 for further information.

Status Indicators

The emulated operator panel emulates the following status indicators:

- Ready
- Attention
- Forms
- Graphics Check
- Change Font
- System Available

When an emulated indicator is on, it appears in reverse image on the options screen.

Ready Indicator

The Ready indicator is turned on by selecting the Start option. Whenever the indicator is on, the printer Emulation Program is ready to send data to the printer.

The Ready indicator is turned off by an end of forms condition, a Reset command from the host, a printer error (printer in a not ready state), a graphics check error, or an attention message from the host. You can turn it off by selecting the Stop/Reset or the Suspend option.

Attention Indicator

The Attention indicator turns on when the attention of the operator is required by the host. The indicator can be turned on by a system unit printer condition that turns the Ready indicator off and turns the Forms or Graphics Check indicator on.

Selecting the Stop/Reset option turns this indicator off.

Forms Indicator

The Forms (out of paper) and Attention indicators notify you that the printer has run out of paper. Select the Stop/Reset option to turn the Forms and Attention indicator off. After a new supply of paper has been loaded and the printer is made ready, select the Start option to resume printing.

Graphics Check Indicator

The Graphics Check indicator is on when an unprintable character is detected in the print buffer and the Set Graphics Error Action command stop option had been set previously. (The line containing the unprintable character is printed with a substitute character in place of the unprintable character.)

The Ready indicator is turned off and the Attention indicator is turned on when the Graphics Check indicator is turned on.

Selecting the Stop/Reset option turns the Graphics Check indicator off.

Change Font Indicator

The Change Font indicator is turned on when a request is received to change the font. The 2-digit code that appears in the output data field describes the requested font. See Appendix A, Handling Error Codes and Messages for the description of the codes.

Note: This indicator is not used with a printer that can change fonts without user interventions (specified when you configure advanced printer options).

System Available Indicator

The System Available indicator is turned on whenever a printer command other than a Reset command is received by the printer Emulation Program.

This indicator is turned off when communication with the host stops.

Printer Session Number (Sn)

The printer session number appears on line 25 as Sn (where n is the number of the session).

Station Address Number (Ax)

The printer work station address is displayed on the emulated control panel. Pressing the WS Addr key sequence again removes the address from the emulated control panel.

User-Defined Printer

The Emulation Program allows you to make a non-supported printer class known to the program. To do this, you create a printer function table that the Emulation Program uses to convert controls into the escape sequences, controls, and graphics understood by the printer.

See "Using the Print Function Table Setup Program" in the Technical Reference manual for help in creating printer function tables.

Chapter 8. Emulating an IBM 5256 Printer

The following printers are capable of emulating the 5256 printer:

- IBM 5152 Matrix Printer (Model 001)

- IBM 5152 Graphics Printer (Model 002)

- IBM 5201 Quietwriter Printer

- IBM 5182 Color Printer

- IBM 5216 Wheelprinter

- IBM 4201 Proprinter

- IBM 4202 Proprinter XL using supplied PFT

- IBM 4207 Proprinter X24

- IBM 4208 Proprinter XL24 using supplied PFT

- IBM 3812 Pageprinter using supplied PFT

- User-defined printer

Introducing 5256 Emulation

One of the above printers can be used to emulate the IBM 5256 Matrix Printer when the second session of the Emulation Program is configured for 5256 printer emulation. Any printer capable of emulating a 5256 may be attached. However, functions not available on the 5256 are not supported, even though the attached printer may support them.

For example, a 3812 emulating the 5256 is different from a 3812 directly attached to the host. This means that 3812 functions such as bold printing and the Set Text Orientation command are not supported.

Notes:

1. The keyboard customization file which was in effect for the display emulation session is also in effect for printer emulation.

2. Printer emulation continues when in PS/2 or personal computer mode unless the printer session has been suspended prior to entering that mode.

3. Transparent mode or Buffer Print is not supported with the Emulation Program.

The IBM 5256 Printer Emulation uses a configuration profile. (See "Configuring for Emulation" on page 2-18 for further information.)

The PS/2 and personal computer display screen emulate the IBM 5256 printer's operator panel in printer emulation mode.

Serial Printer Limitations

If you will be using a serial printer, you should be aware of the following limitations:

- No other communications adapters (SDLC, BSCA, etc.) may be used concurrently in the system unit.

- Only one Asynchronous Communications Adapter may be in used in the system unit.

- The printer emulation code cannot detect "Printer Off Line" or "Paper End" conditions in the serial printer. The printer Emulation Program will try to transmit data to the printer until all data has been successfully transmitted. Printer emulation will indicate Printer Off Line if either condition occurs.

- Baud rate is limited to a maximum of 4800 when running on the IBM Personal Computer, the IBM Portable Personal Computer, or the IBM Personal Computer XT. It is your responsibility to make sure this rate is not exceeded.

If, during initialization, the printer Emulation Program detects that this limitation has been exceeded, the selected baud rate will be overridden to 4800 baud and unexpected results may occur.

Setting Up the Printer

The Emulation Program sets up the attached system unit printer according to options chosen during configuration. LPI, CPI, paper width, form feed, and font changes without user intervention can be specified. (See "Advanced Printer Options" on page 10-6 for more information.)

Each defined printer session requires a separate printer.

The Emulation Display

The options and indicators appear as follows:

```
            5256 PRINTER EMULATION - OPERATOR SCREEN


  OPTION MENU:                          INDICATORS:

  1  Start                              Ready
  2  Stop/Reset
  3  Suspend                            Attention
  4  Cancel
  5  Line Feed                          Forms
  6  Form Feed
  7  Select Printer Parameters          Graphic Check

                                        Data Cleared

  SELECT OPTION    _                    System Available




                                        S2
```

Figure   8-1. The IBM 5256 Matrix Printer Options

Using the Emulated Printer Options

The printer options screen emulates the following operator switches:

- Start
- Stop/Reset
- Suspend
- Cancel
- Line Feed
- Form Feed
- Select Printer Parameters

These switches are selected as options from the 5256 Matrix Printer options screen and are entered by pressing the associated number and then pressing ENTER.

Start Option

Selecting the Start option while the Ready indicator is on performs no function since its intended function is to make the printer ready.

If the Ready indicator is off when the Start option is selected, the result depends on the condition of the printer emulation routine as shown in Figure 8-2 on page 8-5.

Figure 8-2. Start Option	
Condition	**Result**
Emulation Program just loaded and no error conditions exist.	Turns the Ready indicator on.
Printer Emulation Program has just been halted by the Stop/Reset option, or the Stop/Reset option was just used to reset an error condition.	Turns the Ready indicator on and continues printing.
Printer Emulation Program has just been halted by the Suspend option.	Turns the Ready indicator on, returns system unit printer control to 5256 printer emulation, restores the printer to the state it was in at the time the Suspend option was selected, and continues printing. The current print line becomes the logical top of page.

Stop/Reset Option

Selecting the Stop/Reset option while the Ready indicator is on causes the Ready indicator to be turned off. The printer continues printing until its buffer is empty. The Emulation Program does not process any further commands from the host until the Start option is selected.

If this option is selected when the Ready indicator is off, it functions as a Reset key.

This option is intended to temporarily halt printing and allow adjustments to the printer, such as changing paper.

Suspend Option

Selecting Suspend while the Ready indicator is on causes the Ready indicator to be turned off and all information in the printer's print buffer to be printed. The Emulation Program does not process any further data or commands from the host.

In addition:

- The current status of the emulated 5256 printer is saved.

- The forms advance to the first print line of a new page.

- The printer enters its initialized state (Ready and Online).

- All operator panel options except Start are disabled.

This option allows the operator to free the printer from the host and make it available to the system unit. Use the Hot Key sequence to go to PS/2 or personal computer mode.

After the Hot Key sequence, the operator can move the forms to any desired position and use the printer for any system unit printing. When finished, the operator should position the forms to the first print line of a new page.

The Suspend option is accepted regardless of the state of the Ready indicator.

Note: This option is necessary only if the application program uses the same printer device name (LPT1, LPT2, and so on) as the Emulation Program (selected via the configuration program). If the application program is using a different printer, then the Emulation Program can print at the same time as the application program without being suspended.

Cancel Option

Selecting the Cancel option causes the host to be notified of the cancel request.

Line Feed Option

Selecting the Line Feed option when the Ready indicator is off advances the forms to the next print line.

The Line Feed option is ignored when the Ready indicator is on.

Form Feed Option

Selecting the Form Feed option when the Ready indicator is off advances the forms to the first print line of the next form.

The Form Feed option is ignored when the Ready indicator is on.

Note: The operation of this option depends on previous commands to the printer. That is, the form length assigned by the host program must be the same as the actual length of the form.

Printer Parameters

The printer parameters appear as shown in Figure 8-3 on page 8-8.

```
         5256 PRINTER EMULATION - PRINTER PARAMETERS


  SELECT LINES PER INCH (LPI)

     1  6 LPI      [ACTIVE]
     2  8 LPI


  SELECT CHARACTERS PER INCH (CPI)

     3  Normal (10 CPI)
     4  Compressed (15 CPI)     [ACTIVE]


     5  Return to Operator Panel

  SELECT OPTION       _

   OPERATOR MESSAGE FIELD                        S2
```

Figure 8-3. The Emulated IBM 5256 Matrix Printer Parameters

Lines Per Inch (LPI)

6 LPI Option

Selecting 6 LPI (lines per inch) causes the printer to print six lines of text per inch of page length.

8 LPI Option

Selecting 8 LPI (lines per inch) causes the printer to print eight lines of text per inch of page length.

Note: The current line spacing option is indicated with the word ACTIVE appearing next to the option selected.

10 CPI Option

Selecting 10 CPI (characters per inch) causes the printer to print 10 characters per inch. If the attached printer has an eight inch paper width, and if more than 80 characters are formatted for a line, the extra characters are printed on the following line.

15 CPI Option

Selecting 15 CPI causes the printer to print 15 characters per inch (compressed print). When the attached printer has an eight inch paper width, this option allows 132 characters to be printed on a line.

Note: The current character spacing option is indicated with the word ACTIVE appearing next to the options selected.

Status Indicators

The emulated operator panel emulates the following status indicators:

- Ready

- Attention

- Forms

- Graphics Check

- Data Cleared

- System Available

When an emulated indicator is on, it appears in reverse image on the options screen.

Ready Indicator

The Ready indicator is turned on by selecting the Start option. Whenever the indicator is on, the printer Emulation Program is ready to send data to the printer.

The Ready indicator is turned off by the following:

- End of forms condition

- Reset command from the host
- Printer error (printer in a not ready state)
- Graphics check error
- Attention message from the host.

You can turn it off by selecting the Stop/Reset or the Suspend option.

Attention Indicator

The Attention indicator turns on when the attention of the operator is required by the host. The indicator can be turned on by a PS/2 or personal computer printer condition that turns the Ready indicator off and turns the Forms or Graphics Check indicator on.

Selecting the Stop/Reset option turns this indicator off.

Forms Indicator

The Forms (out of paper) and Attention indicators notify you that the printer has run out of paper. Select the Stop/Reset option to turn the Forms and Attention indicator off. After a new supply of paper has been loaded and the printer is made ready, select the Start option to resume printing.

Graphics Check Indicator

The Graphics Check indicator is on when an unprintable character is detected in the print buffer and the Set Graphics Error Action command stop option had been set previously. (The line containing the unprintable character is printed with a substitute character in place of the unprintable character.)

The Ready indicator is turned off and the Attention indicator is turned on when the Graphics Check indicator is turned on.

Selecting the Stop/Reset option turns the Graphics Check indicator off.

Data Cleared Indicator

The Data Cleared indicator is turned on when a Clear command is received from the host to tell the operator that a problem has occurred and all print buffers have been cleared of data. See the appropriate host instructions for recovery procedures. After the cause of the problem has been corrected:

1. Select the Stop/Reset option to turn off the Data Cleared indicator.

2. Align the forms to print the first line.

3. Make the printer ready.

4. Select the Start option to make the Emulation Program ready.

System Available Indicator

The System Available indicator is turned on whenever a printer command other than a Reset command is received by the printer Emulation Program.

This indicator is turned off when communication with the host stops.

Printer Session Number (Sn)

The printer session number appears on line 25 as Sn (where n is the number of the session).

Station Address Number (Ax)

The printer work station address is displayed on the emulated control panel. Pressing the WS Addr key sequence again removes the address from the emulated control panel.

User-Defined Printer

The Emulation Program allows you to make a non-supported printer class known to the program. To do this, create a printer function table that the Emulation Program uses to convert controls into the escape sequences, controls, and graphics understood by the printer.

See "Using the Printer Function Table Setup Program" in the Technical Reference manual for help in creating printer function tables.

Chapter 9. Plotting Graphics

This program will support one of the following plotters attached to the Asynchronous Communications Adapter (RS-232 interface):

- IBM 7371 Plotter

- IBM 7372 Plotter

- IBM 6180 Plotter

Data transfer rates in excess of 1200 bits per second [baud] are not recommended.

The plotter is not supported with a system unit that is not directly attached. The PS/2 and personal computer cannot handle the Asynchronous Communications Adapter and the Synchronous Data Link Control Communications Adapter or Binary Synchronous Communications Adapter at the same time.

The host-generated graphics data stream is using IEEE-488 protocol. The Emulation Program removes the IEEE-488 protocol commands and the remaining data is sent to the plotter via the RS-232 interface. The VDI commands are not used.

The plotter is not supported when there is an active serial printer session.

Chapter 10. Advanced Configuration

Introduction

This chapter explains the following advanced configuration options:

- Display session options

- Printer session options

- Graphics.

See Chapter 2, "Preparing the Emulation Program" on page 2-1, for information about using the configuration and Emulation Programs.

Advanced Display Options

The following options are available for each session you have configured as a display:

- Select additional display options

  - Bypass Presign-on Screen
  - Immediate Hot Key Option
  - Enable/disable keystroke buffering
  - Set print screen character set
  - Enable/disable autodim feature

- Select emulated display device and PC/5292-2 graphics

- Select adapter I/O address

- Customize display EBCDIC to ASCII table

- Customize screen colors and attributes

- Select monitor types for color graphics adapter

- Select workstation address list

- Set column separator attribute.

The options for customizing the display appear when you choose 'Select Display Emulation Options' from the Advanced Options menu.

More Display Options

Additional options appear when you choose 'Select additional display options' from the Advanced Display Options menu.

Bypass Presign-On Screen

The presign-on screen displays the sessions as they become active when you load the Emulation Program. This option allows you to bypass the presign-on screen when you load the Emulation Program. Otherwise, you need to press ENTER to erase the screen before you can continue.

Immediate Hot Key Option

This option instructs the Emulation Program to switch to the DOS session immediately after you load the program, instead of after the first active session.

You can use this option in conjunction with the Bypass Pre-sign-on screen option to load the Emulation Program from a batch file, then return automatically to the batch file processing.

Buffer Keystrokes

This option allows you to "type ahead," that is, continue typing while the host Input Inhibit indicator is on. If keystroke buffering is configured for a session and the Input Inhibited indicator is ON, up to 32 keystrokes are stored and then sent to the host when the Input Inhibited indicator is OFF. If more than 32 keys are pressed, an alarm is sounded for each key and the key-stroke is discarded. As the buffer space is freed, additional key-strokes sent to the host are buffered.

Print Screen Character Set

This option allows you to specify the number of characters used when you print the screen. For example, the IBM Graphics Printer and Proprinter can print 255 characters, while the IBM Matrix Printer prints 127. If you use a printer that can print 255 characters, you need to specify the 255 character set.

Auto Dim Feature

This option instructs the Emulation Program to dim the display after the number of minutes of no activity that you specify. Consider using this option if you leave the screen unattended, but do not want to stop sessions. This will prolong the life of the hardware.

Emulated Display Device

Select Option 1 to emulate a standard display. The emulated display will appear to the host as a 3196 display.

Select Option 2 to use Host Graphics Support. Your display session will accept a subset of the 5292-2 data stream. Your system unit session will appear to the host as a 5292-2. This support is limited to one emulated display session.

There are additional options associated with host graphics support that you can configure. The program, GCONFIG.EXE, provides these options. You may run that program to update the profile you are creating.

The device ID you select is sent to the host when Enhanced 5250 Emulation comes on-line. The host must be configured to expect the device type you indicate for the workstation address you specified.

Adapter I/O Address

The I/O address assignment is the starting address at which the emulator adapter responds to system unit I/O instructions. It should be altered only when additional hardware is installed that conflicts with the emulator hardware address. This assignment must match the on-card switch setting. Changing this value implies the on-card switches have been modified. Refer to the Enhanced Display Station Emulation Adapter *Guide to Operations* manual for the correct address for a card switch setting.

EBCDIC-to-ASCII Table

The EBCDIC-to-ASCII table provides the translation of EBCDIC values 00 through FF to ASCII. The default table supports all standard host applications. (See your Technical Reference manual for these tables.)

This option allows you to modify the translation of host EBCDIC characters to PS/2 or personal computer ASCII characters. Changing the tables affects only the appearance of characters displayed on the system unit, not what is sent to the host.

An example of the use of this option is to assign the ASCII line-drawing characters to unassigned EBCDIC codes to display lines and box corners in a display session.

Screen Colors and Attributes

This option allows you to change the display attributes:

- blink
- column separator
- high intensity
- normal
- reverse
- underscore
- screen color.

The configuration program first prompts you to specify if the display is color or monochrome. It then displays the hex values of the attributes. You can define the appearance of the attribute. See the Technical Reference manual for a list of attributes and their corresponding hex codes.

The host attribute codes hex 20 and 21 determine the appearance of the display session status line indicators and the printer operator panel. Hex 20 determines their appearance when they are OFF, and hex 21 when they are ON. You cannot assign hex 20 and 21 the same attribute value.

Monitor Type

This option allows you to specify the type of monitor connected to your color graphics adapter card in your system unit.

Work Station Address List

In basic configuration, you specified a unique address for each session. You can also enter a list of addresses (that is, an address search list) for a session. This allows, for example, four users to share three addresses. The host allows up to seven addresses on a local work station line. You can include up to six addresses in a list. The Emulation Program listens to the line and searches for the first address that is not being used by any other work station. The host first tries the station address specified as "Primary Address," then it tries the remaining addresses in the list.

The addresses should be rotated to reduce the chance of an address conflict. For example, if there are four users (A, B, C, and D) sharing three addresses (1, 2, and 3) the lists should be set up as follows.

Figure 10-1. Work Station Address List				
User	**A**	**B**	**C**	**D**
Address list	1, 2, 3	2, 3, 1	3, 1, 2	1, 2, 3
Address one will likely get	1	2	3	1 (if user A is not online)

Notes:

1. Do not mix display and printer addresses in the same address list.

2. If two work stations attempt to use the same address at the same time, unpredictable results can occur.

Column Separator Character

This option allows you to change the character used by the PS/2 or personal computer to emulate 5250 column separation. You can also change the character that appears in a host entry field when you type a blank with the Spacebar.

Advanced Printer Options

The following advanced printer options are available:

- Printer hardware characteristics

  - Enable/disable printer alarm
  - Printer paper width
  - Characters per inch
  - Lines per inch
  - Prompt to change character density
  - Initial paper handling equipment
  - 5219 Printer hardware options
    - Number of cut sheet drawers
    - Envelope hopper

- Customize printer EBCDIC to ASCII table

- Customize printer initialization string

- Select parallel or serial printer options.

The options for customizing the printer appear when you choose 'Select Printer Emulation Options' from the Advanced Options menu.

Printer Hardware

Audible Alarm

If the audible alarm is enabled, the Emulation Program sends a BEL command to the system unit printer when the host sends a BEL command or when a graphic check occurs. The audible alarm will be enabled by default.

Printer Paper Width

You can specify a paper width of either 8 or 13.2 inches. When a system unit printer with a paper width of 8 inches is used to emulate a 5256, 5224, or 5219 Printer, the Emulation Program will not allow printing beyond 8 inches. If the auto new line function is active, a new line operation equivalent to the New Line single byte control will be performed before printing the next graphic character. If the auto new line function is deactivated, an exception condition occurs.

CPI and LPI Selection

When emulating a 5256 or 5224 Printer, you can specify the default characters per inch (CPI) and lines per inch (LPI). The Emulation Program uses these defaults until a print job requests a specific CPI or LPI. If these values are not supplied, the Emulation Program uses 10 CPI and 6 LPI.

User Prompt for Font Change

When using 5219 or 5224 Printer functions, you may need to change the physical font element to change the CPI. For example, the IBM 5216 requires a printwheel change. This option allows you to indicate if the attached printer has this requirement. If you specify that a prompt is required, the Emulation Program will request a font change each time the CPI is changed by the host. Otherwise, the Emulation Program will send the CPI change to the printer and no user intervention will be requested.

You can also use this option if you have defined a non-supported printer to use 5219 printer functions. If you define a control sequence in the printer function table to change the font and request no prompt with this option, the Emulation Program sends the command internally to change the font instead of prompting with the Change Font indicator.

Paper Handling Equipment

This option allows you to specify whether the printer uses continuous forms or cut sheets. The Emulation Program uses this option to determine how to perform page ejection.

5219 Printer Paper Feed Hardware

You can specify the type of paper feed hardware you want to attach to the printer. If a print job requests a type of paper feed that has not been defined for your printer, the Emulation Program will request manual insertion of the required form. These types of paper feed hardware can be specified:

- One or two drawers
- Envelope feed.

EBCDIC-to-ASCII Table

You can modify the table used to translate host EBCDIC characters to PS/2 or personal computer ASCII characters. The Emulation Program maintains two EBCDIC-to-ASCII translation tables, one for word processing applications and one for data processing applications. Any EBCDIC-to-ASCII translation modifications you make affect both tables.

Printer Initialization String

Up to 32 bytes of initialization data may be specified for the printer. Each time you start the printer session, the Emulation Program will send the initialization data to the printer.

Parallel Attachment Options

If the system unit printer is parallel attached, you can specify LPT1, LPT2, or LPT3 as the port used to communicate to the printer. The default port is LPT1.

Serial Attachment Options

To configure a serial (asynchronous) attached printer, you will need to know the following information:

- Async port name (COM1 or COM2)
- Communication speed (baud rate)
- Number of data bits per frame (7 or 8)
- Number of stop bits per frame (1 or 2)
- Use of parity bit (none, even, or odd).

This information depends on how your particular serial attached printer is configured. See the operator's guide for the printer for specific information.

Note: The Emulation Program cannot distinguish between Not Ready and End of Forms conditions for serial attached printers. If either of these conditions occur, the Emulation Program will report that the attached printer is offline.

Configuring for Host Graphics

If you plan to use Host Graphics Support (HGS), you may want to run the graphics configuration program after you configure a display session for host graphics.

Graphics Characteristics

You can change the following graphics characteristics:

- Plotter setup

- Width/height ratio

- VDI buffer size

- Line style mapping

- Writing mode

- Color mapping.

VDI must be loaded and initialized before you modify the above graphics characteristics.

Plotter Characteristics

This option defines the plotter information needed for the host system and the PC 5292-2 graphics program to communicate with the plotter. All six parameters must match the switch setting on the plotter.

Width/Height Ratio

You can change the width to height ratio for pie charts to make them look more circular or oblong. The default is one to one (circular).

VDI Buffer Size

The VDI buffer saves the commands that build pictures on the display. This option allows you to increase the buffer size if you plan to shift in and out of graphics sessions (with the Hot Key function or Local Select 1). Increasing the buffer size ensures that the graphics display will be saved. The default (and minimum) size is 20,000 bytes.

Line Styles

The host supports seven line styles:

- Solid

- Long dash

- Dotted

- Dash/dot

- Medium dash

- Dash/two dots

- Short dash

You can change any of these defaults to another line style to be displayed by the host.

Writing Mode

Writing mode determines how the background or previous figure is displayed (for example, what appears between the dots in a dotted line). You can change the defaults of functions 4, 7, and 8. See the *Graphics Development Toolkit* for more information.

Color Mapping

If the system unit supports fewer than eight colors, you can change how those colors are mapped to the eight host colors.

Graphics Configuration Procedure

The defaults for graphics sessions emulate host graphics as closely as possible. Run a session with Host Graphics Support to see if you want to change any defaults.

Notes:

1. You cannot configure for graphics if you are running a host graphics session. Stop the graphics session, then proceed.

2. You must install and initialize VDI before you configure graphics. See "Selecting Graphics Device Drivers" on page 2-13 for instructions.

Fixed Disk Drive System

Use this procedure to configure graphics characteristics for a fixed disk drive system:

1. Switch to the DOS session. Change directories to the location of the emulation code, if necessary.

2. At the DOS prompt, type:

   GCONFIG *yourfile*.**DAT**

   where *yourfile*.DAT is the name of the file specified during CONFIG execution.

   Press ENTER. The Graphics Configuration Main Menu appears.

3. Select the options at the main menu that you want to change. See "Graphics Characteristics" on page 10-9 for a description.

4. Make the desired changes.

5. When you have finished, select the option to save the configuration. The program prompts you to enter the session profile name.

6. After you save the configuration, select the Quit option to exit.

Diskette Drive Only System

Use this procedure to configure graphics characteristics for a diskette drive only system unit.

This procedure assumes that you have already created two working diskettes for a system unit without a fixed drive and ran configuration for the Emulation Program. Refer to "Program Installation for a Diskette Drive Only System" on page 2-5, if you have not created your working diskettes. Refer to "Using the Configuration Program" on page 2-20, if you have not run emulation configuration (CONFIG).

1. If your system unit is not powered on, restart the unit with your first working diskette.

2. Copy the *yourfile.DAT* file from your first working diskette to your second working diskette, where *yourfile* is the name of the file created during CONFIG execution.

3. Insert working diskette 2 in Drive A:

4. At the DOS prompt, type

   GCONFIG *yourfile*.DAT

5. Press ENTER. The Graphics Configuration Main Menu appears.

6. Select the options at the main menu that you want to change. See "Graphics Characteristics" on page 10-9, for a description.

7. Make the desired changes.

8. When you have finished, select the option to save the configuration. The program prompts you to enter the session profile name.

9. After you save the configuration, select the Quit option to exit.

10. Copy the file that you used with the GCONFIG command (*yourfile*.DAT) to your first working diskette. You can now use working diskette 1 to start the Emulation Program.

Appendix A. Handling Error Codes and Messages

Introduction

This appendix contains all error codes and messages for the Emulation Program. This information is from the following sources:

- Communications Errors

- Configuration Messages

- Controller Errors

- Data Stream Errors

- Initialization Messages

- Four-Digit Error Codes

- Graphics Functions

- Operator Errors

- Plotter Messages

- 5219 Printer Messages

- 5224 Printer Messages

- 5256 Printer Messages

General Information

CAUTION:
References to specific keys are related to the PS/2 or personal computer style keyboard profile. If you are using a different style keyboard profile or if you have redefined any of the keys, use the appropriate key.

If a keying error occurs when you are typing information while in an emulated session, a four-digit error code is displayed on the screen (usually on the last line).

Find the four-digit error code in this appendix and follow the recovery procedure.

If keystroke buffering has been selected:

- Additional keystrokes are buffered and must be cleared using the Error Reset key or the I Reset key sequence before further recovery actions can be taken.

If keystroke buffering has not been selected:

- The host ignores any additional data entered from the keyboard.

- The system unit beeps each time you press a key.

Notes:

1. Error codes 0040 through 0054 are communication type errors and are valid when the system unit is attached as a remote work station through the IBM 5294, or IBM 5394 controllers. These errors must be corrected at the controller.

2. Two-digit graphics error codes (not local error codes) that define graphics errors are displayed on the status line of the system unit and also are available to the programmer by using the read status graphics order.

3. With printer emulation the Emulation Program can only detect the end of forms (out of paper) and printer not ready conditions on the PS/2 and personal computer printers. If you do not know how to respond to a printer message, see the Operator's Guide for the printer you are using.

Using the Help Function

Some hosts provide assistance for error recovery. If an error code is displayed after you sign on to the host, press the emulated HELP key. A message is displayed describing the error condition. After you finish reading the message, press the emulated ERROR RESET key and follow the recovery procedure listed for the error code. You should then be able to continue typing data on your system unit.

Additional Information

Additional error information can be found in the host system messages manual. If you are not able to recover from an error refer to Appendix B, Handling Problem Determination.

Error Codes and Messages

aaaaa.bbb, File Not Found (Error 100)

You requested a file name on the command line (using l=aaaaa.bbb) that was not on the requested (or default) drive. The Emulation Program displays this message, then returns control to DOS. A requested file must exist if the Emulation Program is to run.

aaaaa.bbb, Unusable Initialization Data (Error 200)

The configuration file exists, but does not contain data in the proper format for configuration data. The configuration file is generated by the configuration program (CONFIG.EXE) and can only be edited by CONFIG.EXE. If the Emulation Program does not recognize the configuration data, it displays this message and returns control to DOS. You should delete the configuration file and run CONFIG.EXE to generate a new file.

aaaaa.bbb, Unusable Printer Function Table

The Printer Function table exists, but does not contain data in the proper format. A printer function table is generated by the PFTSETUP program (PFTSETUP.EXE), and can only be edited by PFTSETUP.EXE. If the Emulation Program does not recognize the configuration data, it displays this message and returns control to DOS. You should delete the PFT file and run PFTSETUP.EXE to generate a new file.

x — Invalid Letter on Command Line

The letter **x** on the command line is not recognized as a valid option. The error is usually caused by not entering an **I=**, **K=**, or **P=** in front of a file name.

Attached Printer Offline (5219, 5224, 5256 Emulation)

The printer was not online when you requested a printer operation.

This message is removed when the Start option is successfully completed by the program.

Attached Printer Offline: Data Loss May Have Occurred (5219, 5224, 5256 Emulation)

The Emulation Program tried to send host data to the printer, but a *printer not ready* condition exists.

The printer's internal buffer may have lost some information. The host is only informed that the printer was not available. It is not aware of any possible loss of information. If any information was lost, see the appropriate host recovery procedures.

This message is removed when the Start option is successfully completed by the program.

Note: If you do not know how to respond to an error message, see the operator's guide for the printer you are using.

Cannot Continue, Press Any Key to Exit

No address is available on the address list for the first session. Press any key to return to DOS.

DOS Version Not Supported

The Emulation Program requires DOS Version 2.1, 3.1, or later. You must restart your system unit with DOS Version 3.1 or later if you are using an IBM Personal Computer AT. If you are using an IBM Personal Computer XT 286, restart with DOS 3.2 or later. If you are using a PS/2, restart with DOS 3.3 or later.

End of Forms (5219 Emulation)

Meaning

When an end of forms (out of paper) condition is indicated, the following happens:

- The Ready indicator is turned off.

- The End of Forms indicator is turned on.

- The host is notified of the end of forms condition.

Recovery

1. Insert paper and make the printer ready.

2. Select the Start option on the emulated operator panel. The Ready indicator is turned on.

End of Forms (5224 Emulation)

Meaning

When an end of forms (out of paper) condition is indicated, the following happens:

- The Ready indicator is turned off.

- The Attention and Forms indicators are turned on.

- The host is notified of the End of Forms condition.

Recovery

1. Insert paper and make the printer ready.

2. Select the Stop/Reset option on the emulated operator panel. The Attention and Forms indicators are turned off.

3. Select the Start option on the emulated operator panel. The Ready indicator is turned on.

End of Forms (5256 Emulation)

Meaning

When an end of forms (out of paper) condition is indicated, the following happens:

- The Ready indicator is turned off.

- The Attention and Forms indicators are turned on.

- The host is notified of the End of Forms condition.

Recovery

1. Insert paper and make the printer ready.

2. Select the Stop/Reset option on the emulated operator panel. The Attention and Forms indicators are turned off.

   Note: If the printer was turned off to correct the End of Forms condition, select the Suspend option before you select the Stop/Reset option.

3. Select the Start option on the emulated operator panel. The Ready indicator is turned on.

Four-Digit Error Codes

0000   No Help Text Available

Meaning: You have pressed the emulated Help key; however, either no error code was displayed or the error was issued by a program that does not support this function.

Action: Press the emulated ERROR RESET key. Then continue, or refer to the meaning of the previously displayed error code and take the action described.

0001   Keying too Fast

Meaning: The host or controller could not keep up with the rate at which you were pressing keys, and the last keys pressed were not recognized.

Action: Press the emulated ERROR RESET key and then continue.

0002   Received Invalid Code

Meaning: The host or controller received a key code that is not valid and therefore does not recognize which key you pressed.

Action: Press the emulated ERROR RESET key and try to continue.

0003   Key Not Command Key

Meaning: You have pressed the emulated Cmd key, but the next key you pressed was not one of the command function keys.

Action: Press the emulated ERROR RESET key and continue by using the correct keys.

0004   Protected Field

Meaning: You have attempted to press a key for a field that does not allow keyboard input. This field is defined as an input/output feature field.

Action: Press the emulated ERROR RESET key.

0005   **Protected Field**

Meaning: You have attempted to press a key for a field that is not an input field. Data cannot be entered into a protected area of the screen.

Action: Press the emulated ERROR RESET key and move the cursor to a valid input field.

0006   **Invalid Entry**

Meaning: After pressing the emulated Attn key and prior to pressing the emulated Enter key, or the emulated Error Reset key, you pressed a key that is not valid.

Action: Press the emulated ERROR RESET key and use a valid key sequence.

0007   **Must Enter Field**

Meaning: There is at least one mandatory field on the screen into which you must enter data before the screen can be changed or moved. (The cursor goes to the first character position of the first mandatory entry field requiring data.)

Action: Press the emulated ERROR RESET key and press the required keys.

0008   **Alphabetic Only Field**

Meaning: The field into which you are trying to enter data takes only alphabetic data and you have pressed a nonalphabetic character. Valid characters are A through Z, blank, comma, period, and hyphen.

Action: Press the emulated ERROR RESET key and continue by pressing valid keys.

0009   **Numeric Only Field**

Meaning: The field into which you are trying to enter data takes only numeric data, and you have pressed a nonnumeric key. Valid characters are 0 through 9, blank, comma, period, plus, and minus.

Action: Press the emulated ERROR RESET key and continue by pressing valid keys.

0010   **Signed Numeric Only Field**

Meaning: The field you are now trying to put data into takes only signed numeric data, and you have pressed an invalid key. Valid characters are 0 through 9.

Action: Press the emulated ERROR RESET key and continue by pressing valid keys.

0011   **Sign Position Only**

Meaning: You have attempted to put data into the last position of a signed numeric field.

Action: Press the emulated ERROR RESET key. Make sure that the data is correct and exit the field by using the emulated Field — key or the emulated Field + key.

0012   **Field Full**

Meaning: There is no room in this field to enter data. Either there is no more room in the field, or the cursor is in the last position of the field.

Do not use insert mode to change data or to enter data into the last position of this field.

Action: Press the emulated ERROR RESET key. Then correct the field, if necessary, and continue.

0013   **Insert Mode On**

Meaning: You attempted to leave a field while the system unit was still in insert mode.

Action: Press the emulated ERROR RESET key and exit the field normally.

0014   **Must Fill Field**

Meaning: You have pressed a function key that would move the cursor out of this field; however, the requirements of this mandatory fill field have not been met. A mandatory fill field must be completely filled or left blank.

Action: Press the emulated ERROR RESET key. Fill the entire field, or move the cursor to the start of the field, then use the emulated Field− key or the emulated Field+ key.

0015   **Does Not Compare**

Meaning: You have entered data into a self-check field; the number and the check digit you have just entered do not compare.

Action: Press the emulated ERROR RESET key. Check that you have used the correct number and check digit. If you have used the correct characters, check that the number is valid for a self-check field.

0016   **Not Signed Numeric Field**

Meaning: You have pressed the emulated Field− key, but the field you are in is not a signed numeric field or (for some hosts) a numeric only field.

Action: Press the emulated ERROR RESET key. Continue by pressing data keys or press the emulated Field+ key.

0017   **Field Not Full**

Meaning: You have pressed the emulated Field− key or the emulated Field+ key; however, the requirements for this mandatory fill field have not been met. A mandatory fill field must be completely filled unless you exit from the first position of the field.

Action: Press the emulated ERROR RESET key. Then continue by pressing data keys to fill the field, or move the cursor to the start of the field, and use the emulated Field− key or the emulated Field+ key.

0018   Nondata Key Required

Meaning: You must use a nondata key such as emulated Field+, emulated Field−, emulated Field Exit, or a cursor movement key to leave this field.

Action: Press the emulated ERROR RESET key. Then use a nondata key to leave this field.

0019   Dup Key Not Allowed

Meaning: You have pressed the emulated Dup key; however, the Dup key is not permitted in this field.

Action: Press the emulated Error Reset key and continue without using the emulated Dup key in this field.

0020   Right Adjusted or Signed Numeric Field

Meaning: You have pressed a key that is not allowed in this field. This is either a right-adjusted or a signed-numeric field, and you must exit the field before pressing any of the following keys: Backspace, emulated Enter, emulated New Line, emulated command, emulated Help, emulated Roll Up, emulated Roll Down, and emulated Home (when the cursor is in the home position).

Action: Press the emulated ERROR RESET key. The cursor is in the same position it was in when you pressed the invalid key. Continue by pressing the emulated FIELD− key or the emulated FIELD+ key.

0021   Must Enter Field

Meaning: The cursor is positioned in a mandatory enter field. A mandatory enter field must have data in it before you can exit the field by pressing the emulated Field+ or the emulated Field− key.

Action: Press the emulated ERROR RESET key and then press the required data keys.

0022 System Error

Meaning: A host error has occurred. The status of the present field is not known. This error can occur during an insert or delete operation.

Action: Press the emulated Error Reset key. Check the screen to determine if the insert or delete function was completed properly. If not, correct the field.

0023 Nonhexadecimal Key

Meaning: You are in hexadecimal mode, but the first key pressed was not an **A** through **F** key or a **1** through **9** key; or the second key pressed was not an **A** through **F** key or **0** through **9** key.

This error also occurs when a hexadecimal code is used in a numeric only, signed numeric, alphabetic only, or input/output field.

Action: Press the emulated ERROR RESET key. Continue by pressing the correct key.

0026 Numeric Only Field

Meaning: You pressed the emulated Field— key to exit a numeric only field, but the last position of the field was not a **0** through **9** key.

Action: Press the emulated ERROR RESET key. Correct the last position of the field or exit the field by using the emulated Field+ key.

0028 Key Not Assigned

Meaning: You pressed a key that is not used by this program.

Action: Press the emulated ERROR RESET key and continue by pressing a valid key.

0029   Not Diacritic Key

Meaning: The second key pressed during a diacritic key function did not result in a valid combination.

Action: Press the emulated ERROR RESET key and enter a valid combination.

0040   Data Set Not Ready

Meaning: The 'data set ready' line is inactive, and it should be active.

Action: Notify the controller operator.

0042   Receive Clock Field

Meaning: The receive clock signal failed during a receive operation.

Action: Notify the controller operator.

0043   Data Set Ready

Meaning: The 'data set ready' line is active, and it should be inactive.

Action: Notify the host or controller operator.

0044   Not Receiving Data

Meaning: The 30-second communication time-out has expired with no valid data being received.

Action: Notify the controller operator.

0050   Clear and Request to Send Not Together

Meaning: Either the 'clear to send' line was inactive while the 'request to send' line was active, or the 'clear to send' line was active while the 'request to send' line was inactive.

Action: Notify the controller operator.

0051   **Transmit Clock Failed**

Meaning: The transmit clock signal failed during a transmit operation.

Action: Notify the controller operator.

0052   **Controller Error**

Meaning: The controller has detected an internal error.

Action: Notify the controller operator.

0054   **Controller Received Invalid Command**

Meaning: The controller received an invalid command from the host.

Action: Notify the controller operator.

0099   **Host Not Available**

Meaning: A key that required host action was pressed, and the host was not available.

Action: Determine when the error occurred (before, during, or after sign-on) then refer to the following for the meaning and recovery procedure topics.

Two-Digit Graphics Error Codes

Two-digit graphics error codes are displayed on the status line of the system unit are also available to the programmer using the *read status graphics* order. See Figure A-1 on page A-16 for a list of two-digit codes.

Each error falls into one of three categories:

- Recoverable Host Errors

- Nonrecoverable Host Errors

- Local Errors.

The series of steps that is performed when the Emulation Program detects a graphics error depends upon the category of

the error. These procedures follow the error codes summarized in Figure A-1 on page A-16.

Recoverable Host Errors

The G5 graphics error is recoverable.

The following events take place when a recoverable type error is detected:

1. Error code is displayed on the status line.

2. Short beep is sounded.

3. Processing continues with the next byte in the graphics block.

4. When a G5 error occurs the appropriate graphics error aid key codes are sent to the host following completion of graphics block processing.

Nonrecoverable Host Errors

The following errors are not recoverable:

E1 G1 P1
E2 G2 P5
E3 G3
E4 G4
E5

The following events take place when a nonrecoverable type error is detected.

1. Error code is displayed on the status line.

2. Short beep is sounded.

3. Graphics block processing is stopped.

4. Graphics mode is terminated.

5. Appropriate graphics error aid key codes are sent to the host.

Local Errors

The following are local errors:

L1
L2
L3
L9

The following events take place when an L9 (nonrecoverable local error) is detected while processing a graphics write block.

1. Error code is displayed on the status line.

2. Short beep is sounded.

3. Graphics is disabled, but the system unit continues to process in text mode.

The following events take place when recoverable errors, L1, L2 or L3, are detected while processing a graphics write block:

1. Error code is displayed on the status line.

2. Short beep is sounded.

3. Processing continues.

The host is not informed of local errors.

Figure A-1 (Page 1 of 3). Two-Digit Graphic Error Codes. The two-digit graphics error codes are summarized in the following chart.	
Two-Digit Code	**Error and Possible Cause**
E1	IEEE bus error. • Invalid configuration data. • Plotter is not powered on. • Plotter is not attached. • No address match between a host assigned listen address and configuration listen address.

Figure A-1 (Page 2 of 3). Two-Digit Graphic Error Codes. The two-digit graphics error codes are summarized in the following chart.	
Two-Digit Code	**Error and Possible Cause**
E2	Talker error: No interface message was received which confirmed the talker address.
E3	Invalid IEEE set order data: Set address = 31.
E4	Time-out error: • No *interface clear order* was received after powering on. • No *interface clear order* was received following an E1 order. • Plotter did not respond after a data transmission within specified time period.
E5	List mode attempted: Interface message was received which assigned the Emulation Program talker to listen.
G1	Invalid graphic byte: • Invalid data byte format. • *More data to come order* received with no preceding data. • Data byte detected when expecting an order.
G2	Undefined order: Order code received which is not supported.
G3	Invalid graphic set order data: • *Set color table* index = 0. • *Set marker style* > 8.

Two-Digit Code	Error and Possible Cause
	Error and Possible Cause
G4	*Fill polygon* error: The number of nonhorizontal fill edges > 128.
G5	Marker outside display boundaries: Center coordinate does not allow entire marker to be drawn.
L1	VDI buffer overflow in graphics state.
L2	VDI buffer overflow not in graphics state.
L3	A polygon is too complex (for example, a large number of intersecting lines) and it cannot be drawn using the current fill pattern. The polygon will be drawn using the hollow fill pattern.
L9	VDI exception
P1	Printer not ready. Printer Data Follows order or System Copy order received from host.
P5	Invalid printer control order data: Load printer A/N color mix table index = 7, 15, 23, or 31.

Figure A-1 (Page 3 of 3). Two-Digit Graphic Error Codes. The two-digit graphics error codes are summarized in the following chart.

Note: The status line error code field is cleared when the emulated reset key is pressed or when a graphics block has been processed with no errors.

Invalid File Name

Not a valid DOS file specification. Refer to your *Disk Operating System* manual for the proper way to name and specify files.

Invalid Option (5219, 5224, 5256 Emulation)

You have selected an option that does not appear on the emulated operator panel.

This message is removed when a valid option is selected.

Keyboard Customization File Errors

Invalid Drive Name

An invalid drive has been named for the keyboard customization file in the configuration file or as an execution time parameter.

Invalid File Name

A file name that does not meet the DOS requirements was requested.

File Not Found

A file could not be found in the current or specified subdirectory on the requested or default drive.

File Empty

The file contains no records.

Invalid Syntax

The record in error follows these error messages on the screen.

= **Sign Missing or Misplaced:** The equal (=) sign must be separated from other characters by at least one space or tab.

Caps Lock Function Definable Only to Caps Lock Key: The Caps Lock function may be assigned to the shifted and unshifted mode of only the Caps Lock key.

Caps Lock Function Not Definable in Alternative Mode: The Caps Lock function may not be assigned in a playback sequence.

Carriage Return or Line Feed Missing: This error occurs if the editor used to create or modify your keyboard customization file does not put a carriage return or line feed at the end of each line. Most editors do this for you.

Define Not Found: The first word of each line in the keyboard customization file must be *define*. This message is displayed when the keyword *define* is missing, misplaced, or misspelled. The word can be shortened, but at least the first three characters, *def* are required. The keyword can be uppercase, lowercase, or both.

Definition Line Exceeds 512 Characters: A definition record was found that exceeds the maximum record length of 512 characters. The first 512 characters of the record follow this message on the screen.

Invalid Character 'x' Found: A character (x), which is not available on a 5250 display, was found in a definition. Refer to the EBCDIC character sets in the Technical Reference manual for a list of the valid 5250 characters.

Invalid Mode Definition: The definition record is trying to assign a shift mode that is not valid. The valid shift modes are:

- Alternative (a-PS/2 or personal computer key name)
- Shifted (s-PS/2 or personal computer key name)
- Nonshifted (PS/2 or personal computer key name)

Invalid Scan Code: The value of the hexadecimal number used for the system unit scan code is not in the range of hex 01 through 7F. The number must contain two digits. Refer to scan code table in the IBM 5250 Emulation Program *Technical Reference* manual for the valid scan codes.

Key Not Definable in Alternative Mode: The Alt, Ctrl, and Scroll Lock PS/2 and personal computer keys cannot be defined in alternative mode. The Emulation Program uses these keys for special purposes, such as, Alt-Ctrl is used to display the work station address where the keyboard buffer indicator is normally displayed.

No Definition: No text follows the keyword *define* on the definition line. The keyword must be followed by an equal sign and a valid 5250 function. See the Technical Reference manual for a description of the definition line.

Null Definition: A null definition is not allowed. Null definitions are two delimiters running side by side. For example:

```
def s-a = ""
def a-a = "This [] 'has a null definition.'
def a-s = ""And so does this one!"
```

Num Lock Function Definable Only to Num Lock Key: The Num Lock function may be assigned to the shifted and unshifted mode of only the Num Lock key.

Num Lock Function Not Definable in Alternative Mode: The Num Lock function may not be assigned in a playback sequence.

PS/2 or personal computer Key Name Not Found: Nothing was found on the definition line after the keyword *define*.   There must be some text following *define*.

Playback Sequence Exceeds 510 Bytes: All available space for storing playback sequences has been used. You must shorten the playback sequences until they all fit into the 510 byte limit.

Playback Sequence Not Allowed After Hot Key to DOS: Playback sequences may not be continued after the sequence causes a hot key to the DOS session. Direct hot keys to DOS with additional playback data will be flagged with this error message. Hot keys to DOS from a round robin hot key cannot be detected during a keyboard customization. When they occur online, the playback sequence will simply be terminated.

Shift Keys Are Not Definable: The left and right system unit shift keys (scan codes 2A and 36) are always defined as shift keys and cannot be changed. A shift key cannot be assigned a string or function. The shift keys can only be used with other keys to select a character or function.

String or Function Delimiter Missing: The string delimiter (' or ") or function delimiter ([or]) is missing or misplaced on the right of the equal sign. Strings must begin and end with the same delimiter (' or ") and the delimiter may not be used inside the string. Functions must begin with a left bracket ([) and end with a right bracket (]).

Unknown Function Name ' *xxxx*': A function name (*xxxx*), which is not available on a 5250 display, was found in a definition. Refer to the Technical Reference manual for a list of valid function names.

The function names can be in uppercase, lowercase, or both.

Unknown Personal Computer Key Name: An invalid name was used for a system unit key. Refer to the Technical Reference manual for valid key names. The special names can be uppercase, lowercase, or both. A common error would be to put a

5250 function name to the left of the equal sign, or to put a blank within the system unit key name.

1 Character or Function Only: Only a single character or function may be assigned to each key in the nonshifted mode. You must use the alternative mode to assign a string.

Line Check on Station Address x

The Emulation Program received data it did not recognize from the host while starting the program (for example, the data contained a parity error). This message indicates a possible hardware error in the host, the cable, or the system unit.

1. Cancel emulation. The system unit is returned to DOS and no sessions are active.

2. Retry. The Emulation Program retries the address list.

If the problem keeps coming back, refer to Appendix B, Handling Problem Determination, for help with line check errors.

Output Data Field Values (5219 and 5224 Printer Emulation)

The output data codes for the IBM 5219 and 5224 printers are listed in Figure A-3 on page A-24. These codes may indicate a print font, a feature, or a condition that has occurred on your printer. Check the table first, then follow these instructions.

If a print font has been requested, refer to the information provided for you or request help from your host system operator.

If the host is expecting a printer operation to occur that uses a feature of your printer, follow the instructions given in the operator's manual for the printer you have attached.

If an error condition has occurred, follow the instructions given in the operator's manual for the printer you have attached.

Figure A-3 on page A-24 describes the output data field values. The columns are:

Figure A-2. Column Definitions	
Column	**Contents**
Value	Output data field value
Setup	Setup indicator on (if x)
Form	Form indicator on (if x)
Except	Printer Exception indicator on (if x)
Operator Action	Requested operator action

The requested operator action for each of the output data values in Figure A-3 requires that the operator perform the action listed and then select the Start option.

Figure A-3 (Page 1 of 2). Output Data Field Values				
Value	**Setup**	**Form**	**Except**	**Operator Action**
Blank		X		Load paper.
01	X			Manual paper feed selected. Install appropriate device.
01		X		Manual paper feed override. Feed paper from drawer 1.
02	X			Tractor feed selected. Install appropriate device.
02		X		Manual paper feed override. Feed paper from drawer 2.
03	X			Automatic sheet feed selected. Install appropriate device.

Figure A-3 (Page 2 of 2). Output Data Field Values				
Value	**Setup**	**Form**	**Except**	**Operator Action**
0E		X		Manual paper feed override. Feed from envelope feed.
10-14 16-17 20-26 30-32 40			X	Contact the host or controller operator and report a formatting error. (Include the value in the Output Data field.)
55				Controller stopped the printer. Contact your host or controller operator for directions.
D1		X		Paper feed type is continuous tractor. Change to source drawer 1.
D2		X		Paper feed type is continuous tractor. Change to source drawer 2.
Any Number				If the Change Font indicator is ON, change to the font indicated by the host system programmer.

PCGRAPH: Attempt To Open Graphics Workstation Failed

You requested that the workstation be open for graphics. Verify that the CONFIG.SYS data set supports graphics.

PCGRAPH: Comm Adapter Conflict With Printer Session

Printer session has already claimed the communications adapter.

PCGRAPH: Default Graphic Parameters Will Be Used

A configuration data set could not be used with the current display device, for example, trying to use 8 colors on a 4-color display. Defaults for the parameters will be supplied by the program.

PCGRAPH: DOS Version Not Supported

DOS version 2.1, 3.1, or later (3.3 or later for the IBM PS/2, 3.2 or later for the IBM Personal Computer XT 286, 3.1 or later for the IBM Personal Computer AT) is required but an earlier version is being used. You must use a supported level of DOS.

PCGRAPH: Graphics Already Running

You attempted to start a second Graphics session. The session was terminated and control returned to DOS.

PCGRAPH: Graphics Buffer Reduced To

xxxxx

Insufficient storage for the VDI buffer was found and the buffer size was reduced to *xxxxx* bytes.

PCGRAPH: Graphics Session Not Found

You requested a graphics session but one cannot be found. Configure a session for graphics and re-execute the program.

PCGRAPH: Insufficient Storage For Graphics Execution

The minimum storage required for Graphics support was not available. You should make additional storage available.

PCGRAPH: Invalid Configuration File Data Format

The format of the configuration data set is invalid. Specify a valid configuration data set.

PCGRAPH: Invalid Stop Bit Value For Selected Baud Rate

You requested an invalid baud rate/stop bit combination during configuration.

PCGRAPH: No Comm Adapter Found At COM1

The communication adapter you requested during configuration was not found.

PCGRAPH: No Comm Adapter Found At COM2

The communication adapter you requested during configuration was not found.

PCGRAPH: PCVDI.EXE Module Not Found

The VDI interface module was not found or could not be loaded. You should place PCVDI.EXE in the same subdirectory as the 5250 Emulator and try loading the module again.

PCGRAPH: Plotter Not Supported

PCGRAPH: Press ENTER To TERMINATE

A terminating situation has been found and the Graphics session is terminated.

PCGRAPH: Selected Baud Rate Value Out Of Range

You requested an invalid baud rate value during configuration.

PCGRAPH: Selected Comm Adapter Value Out Of Range

You requested a communication adapter other than COM1 or COM2 during configuration.

PCGRAPH: Selected Data Bit Value Out Of Range

You requested that the number of data bits be something other than 7 or 8 during configuration.

PCGRAPH: Selected Parity Value Out Of Range

You requested a parity checking value other than 1, 2, or 3 during configuration.

PCGRAPH: Selected Stop Bit Value Out Of Range

You requested that the number of stop bits be something other than 1 or 2 during configuration.

PCGRAPH: Unsupported Graphics Device

You attempted to use an unsupported graphics device. You should specify a supported graphics device.

PCGRAPH: VDI Device Drivers Not Loaded

The VDI Device Drivers are not loaded. Verify that the CONFIG.SYS file is present and that it specifies the correct VDI drivers. Then press the ALT, CTRL, and DEL keys to restart the system.

PCGRAPH: 5250 Emulation Is Not Running

The 5250 Emulation Program was not found. Restart the Emulation Program.

PCGRAPH: 5250 Emulation Version Not Supported

Graphics support requires that the Emulation Program be Version 2.2. You have loaded a different level. Load the correct 5250 Emulation Program.

Printer Emulation Suspended (5219, 5224, 5256 Emulation)

You have suspended printer emulation, and the printer can now be used by a PS/2 or personal computer application program.

This message is removed when the Start option is selected.

Station Address Already in Use

All addresses on the address list for the second session are being used by another work station.

A   Abort: The system unit is returned to DOS and no sessions are active.

R   Retry: The Emulation Program retries the address list. If all stations are still in use, the message reappears.

I   Ignore: The second session is removed and only one session remains active.

System Not Available for Station Ax

This message appears for each address, as it is displayed on the status line, if the host is not trying to communicate to a work station at that address.

1. Cancel Emulation. The system unit is returned to DOS and no sessions are active.

2. Retry. The Emulation Program restarts the search for an available address from the beginning of the address list. If no host activity is still detected, the message reappears.

3. Ignore. The session is put online with the host, even though no host activity for that station address can be detected. This option could be used on hosts (or controllers) that use the auto-configuration feature, to make the system unit ready before the host is turned on.

Waiting for System Avail At Station Ax

The Emulation Program waits approximately 10 seconds for the host to respond.

5250 Card Not Found At I/O Address
xxxx

The Enhanced Display Station Emulation Adapter is not installed at the expected address (xxxx), or the I/O address switches on the card do not match the value expected by the Emulation Program.   Refer to the Enhanced Display Station Emulation Adapter *Guide to Operations* manual to change the switches. The address expected by the Emulation Program must be changed in the "Advanced Display Options Menu" during config- uration if the hardware switches are changed on the card.

5250 Emulator Already Loaded

The Emulation Program is already loaded. You may not load more than one copy of the code in the system unit at the same time. The first copy still functions normally.

5250 Hardware Diagnostic Failure

The initialization program has detected a possible hardware error. Use the Enhanced Display Station Emulation Adapter *Guide to Operations* manual and run the diagnostic program. The system unit returns to DOS.
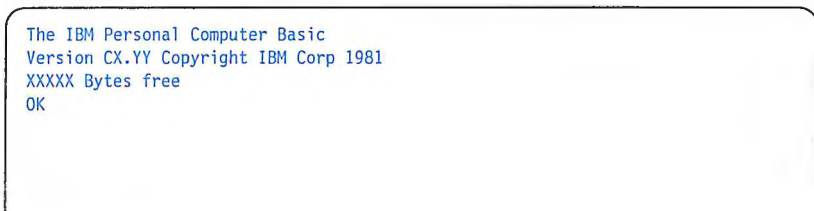
Appendix B. Handling Problem Determination

Introduction

This appendix can help you solve a problem with your PS/2 or personal computer and the 5250 Emulation Program. Check to see if any of the symptoms describe your problem, and take the corrective action.

BASIC Program ID on Screen

You see a screen similar to the following:

```
The IBM Personal Computer Basic
Version CX.YY Copyright IBM Corp 1981
XXXXX Bytes free
OK
```

Figure   B-1. BASIC Program ID

Meaning

The BASIC program loaded in place of the 5250 Emulation Program. DOS did not load.

Action:

1. Make sure you have the correct diskette.

2. Make sure the diskette is inserted properly and the cover is closed.

3. With a fixed disk, make sure COMMAND.COM is in the default root directory.

4. Use the Alt-Ctrl-Del sequence to load DOS.

5. Use the system unit *Guide to Operations* manual to check the diskette drive or fixed disk drive.

Blank Screen

```
                    BLANK SCREEN
```
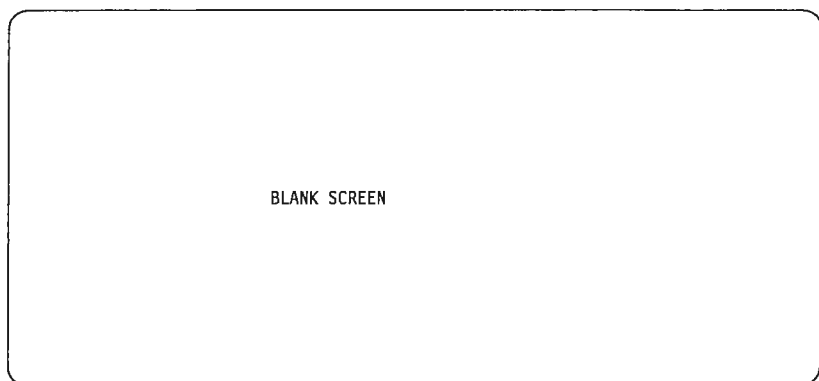
Figure   B-2. Blank Screen

Meaning

The screen is blank. (No status indicators can be seen, and the cursor is missing.)

Action:

1. Make sure the monitor is properly plugged into both power and signal connectors and turned on.

2. Adjust the Brightness control.

3. Turn the system unit Off.

4. Make sure you have power at the electrical outlet.

5. Make sure the system unit power cord is securely plugged into the rear of the system unit and the electrical outlet.

6. Turn the system unit On and listen for the beep.

7. If the screen is still blank, refer to your system unit *Guide to Operations* and run the diagnostics supplied with the program.

Cursor Blinking Upper Left

Figure   B-3. Cursor Blinking Upper Left

Meaning

The cursor is blinking in the upper left corner of the screen.

Action:

1. The System/38 may have varied this session offline.

   This only applies to a System/38 that is running a CPF
   release prior to release 6.0, program change C. Program
   change number 06076 in program change C corrects this
   problem.

   System/38 varies offline a display following the fourth time it
   is powered off without a user signing on. The display must
   be varied online (VRYDEV) before it can be used again.

   The system continues to vary the display offline each time it
   is subsequently varied online, powered on, and powered off
   without a user signing on. On the eighth consecutive power
   off (including the first four, noted above), a warning
   message is sent to the QSYSOPR message queue. On the
   ninth occurrence, the display's subsystem deallocates the
   device. The only way to recover, at this point, is to termi-
   nate (TRMSBS) and restart (STRSBS) the subsystem.

   The counters are reset each time a user signs on to the
   display.

   When invoking the Emulation Program, the user must sign
   on to each emulated display at least once every fourth time.
   This is generally not a problem with the first session. But,

the second session may be configured as a display session and not used. The screen for the offline session will be blank except for the cursor in the upper left corner and the status indicators displayed with System Available on.

2. Contact the host system operator and make sure the host is operating correctly.

Cursor Blinking Upper Right
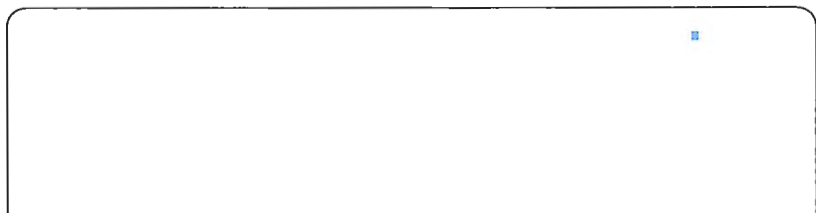
Figure   B-4. Cursor Blinking Upper Right

Meaning
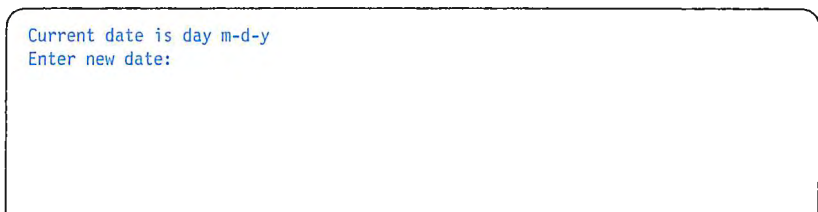
The cursor is blinking in the upper right corner of the screen.

Action:

1. Contact the host system operator and make sure the host is operating correctly.

2. Make sure that the cable between your system unit and the host is securely fastened and is not visibly damaged.

3. Make sure the work station address in the profile of your Emulation Program diskette is correct. Ask your host system operator for assistance.

4. Make sure that only the last work station on your cable is terminated. Ask your host system operator for assistance.

5. If the cursor is still blinking in the upper right corner of the screen, refer to the Enhanced Display Station Emulation Adapter *Guide to Operations* manual and run the diagnostic supplied with the program.

6. If the problem persists, report to the host system operator that your work station is not communicating with the host.

Date Prompt on Screen

You see a screen similar to the following:

```
Current date is day m-d-y
Enter new date:
```

Figure   B-5. Date Prompt

Meaning
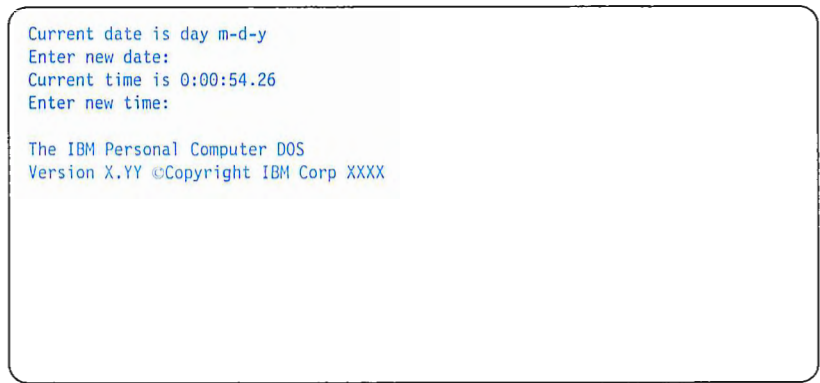
A system reset was performed.

Action:

1. Type the date, if desired, and press ENTER. Or you may press ENTER for the default date.

2. Type the time, if desired, and press ENTER.

3. Reload the Emulation Program, if desired.

DOS Program ID on Screen

You see a screen similar to the following:

```
Current date is day m-d-y
Enter new date:
Current time is 0:00:54.26
Enter new time:

The IBM Personal Computer DOS
Version X.YY ©Copyright IBM Corp XXXX
```

Figure B-6. DOS Program ID

Meaning

The DOS program was loaded. The Emulation Program did not load.

Action:

1. After the DOS prompt appears, type:

   DP5250

2. Press ENTER.

Error Occurred after Sign-On

Meaning

If the work station is locally attached, contact the host system operator to determine if the host is available. If the work station is attached through a controller, this error can be caused by a loss of communication between the controller and the host.

Action:

Press the emulated ERROR RESET key, then try to run a different type of job or procedure. If the error does not occur again, there is a system programming problem or an invalid key was pressed. If the error does occur again and the system unit is attached to a controller, contact the controller operator to determine if communications with the host has been lost and the host is not available. For additional error information, contact the host system operator.

Error Occurred before Sign-On

Meaning

The function key you pressed is not valid at this time.

Action:

Press the emulated ERROR RESET key. Then use the correct procedure to sign on.

Error Occurred during Sign-On

Meaning

Either the host is not operating, or the controller is not communicating with the host.

Four-Digit Error Code

```
 XXXX
```

Figure   B-7. Four-Digit Error Code

Meaning

This error code is displayed in the four leftmost columns in the last row of the screen.

Action:

Find the error code in Appendix A, Handling Error Codes and Messages, and take the action recommended.

Keyboard Not Working

Meaning

When you press any key, no data appears on the screen.

Action:

If the alarm sounds, the keyboard may be input inhibited:

Press the emulated ERROR RESET key.

If the alarm does not sound:

1. Turn the system unit off. Wait 10 seconds, then turn it on.

2. Test the keyboard by pressing a few keys. If the screen remains blank, refer to your system unit *Guide to Operations* and run the diagnostics supplied with the program. If the KB indicator is on, empty the keyboard buffer by pressing the ALT and SCROLL LOCK keys.

Line-Check Error

XX

Figure   B-8. Line Check Error

Meaning

The line check count is displayed as a decimal number at the left end of the status line.

Action:

1. Make sure the cable between your system unit and the host is securely fastened and is not visibly damaged.

2. Make sure you have the diskette for your system unit and the correct work station address in the profile. Ask your host system operator for assistance.

3. Make sure that only the last work station on your cable is terminated. Ask your host system operator for assistance.

4. Turn the system unit off. Wait 10 seconds, then turn it on.

Printer Failure Not Defined

Meaning

If the printer is not operating, you may have forgotten to turn it on before loading the Emulation Program.

Action:

If this situation occurs:

1. Suspend the printer session.

2. Turn the printer on.

3. Ready the printer.

4. Start the printer session.

5. Restart the host print job.

Problem Not Defined

Meaning

A problem still exists. Your work station is not operating as expected and you have none of the previous symptoms.

Action:

1. Contact your host system operator and make sure the host is operating correctly.

2. Make sure the twinaxial cable between your system unit and the host is securely fastened and is not visibly damaged.

3. Make sure you are using the correct profile program for your system unit or make sure the work station address is correct in the profile. Ask your host system operator for assistance.

4. Refer to the Enhanced Display Station Emulation Adapter *Guide to Operations* manual and run the diagnostics supplied with the program.

Self-Loading Program Failed to Load

Meaning

A self-loading program failed to load after Hot Keying from emulation mode, and the same program loads correctly without loading the Emulation Program first. For example, VisiCalc[1] does not load across a 64K storage boundary.

Action:

1. After the DOS prompt appears, type:

   `DP5250 @0160CF`

2. Press ENTER.

   Notes:

   a. Performing the above action will require an additional 24K of memory.

   b. If you are using an AUTOEXEC.BAT file to load the 5250 Emulation Program, you may want to include the above entry.

---

[1] VisiCalc is a registered trademark of VisiCorp.

Transfer Facility Sign-On

Meaning

When requesting data transfers using the IBM System/36 Transfer Facility PRPQ or the IBM System/38 Transfer Facility PRPQ, the user must be signed on for session one.

If the user has not signed on for session one at the time a data transfer request is made, the work station sign-on screen is displayed but keystrokes are not accepted.

Action:

If this situation occurs:

1. End the 5250 Emulation Program by performing a software reset (press and hold the ALT and CTRL keys, and press DEL) to return control to DOS.

2. Restart the 5250 Emulation Program with DP5250, making sure to sign on to session one.

3. Restart the Transfer Facility.

5250 Card Not Found at I/O Address Axxxx

You see a screen similar to the following:

```
5250 CARD NOT FOUND
AT I/O ADDRESS XXXX
```

Figure   B-9. 5250 Card Not Found at I/O Address Axxxx

Meaning

The program was unable to communicate with the Enhanced Display Station Emulation Adapter.

Action:

The emulation card has malfunctioned or is not installed, or the I/O address switches on the card do not match the value expected by the Emulation Program.   Refer to the Enhanced Display Station Emulation Adapter *Guide to Operations* manual to change the switches. The address expected by the Emulation Program must also be changed in the "Advanced Display Options Menu" during configuration if the hardware switches are changed on the card.

Appendix C. Updating the Emulation Program

Introduction

If you experience problems, IBM may instruct you to update the Emulation Program. This appendix explains the commands used to update the program, and how to run the update program.

Note: IBM will supply the update information. The customer will only need to create or edit a file to include this information, then update the Emulation program.

Updating involves two basic steps:

1. Creating or modifying a file with the update information supplied by IBM. This file is called the control data set.

2. Using the Update program to update the Emulation Program with the control data set.

The Control Data Set

A control data set is a file of special commands which give directions to the update program.

Note: The Update program will allow you to update only one file at a time.

The file may be given any unique command name and may be created with any DOS editor that terminates an input line with

```
CR + LF
```

and does not use tabs. Each input line starts a new command for the Update program and has a maximum length of 256 characters. The Update program executes the commands from the control file in order.

All commands in the control data set have positional parameters associated with them, which are separated by blanks. You can enter the commands in upper or lower case.

Following is a list of valid Update commands and their parameters:

B   This command resets any error condition found to this point of execution.

When the apply program detects a mis-compare during a verify command, all following commands are ignored until a new **B** command is executed. Therefore, this command may be used for conditional updating.

Note: Nesting is not allowed.

C   This command allows you to place comment lines within the control file. Any new line in the control file that begins with **C** will be ignored. For example:

```
C   This is a comment line.
C   A comment line is ignored by the program.
```

P   This command updates part of a file. The first parameter for this command is the hex address to start the verify relative to the beginning of the file. This address may have simple hex addition and subtraction within it. Hex values are right-justified.

The second parameter is the data to update with. If this parameter starts with a single quote, the rest of the parameter is considered a character string and is terminated by another single quote. Otherwise, the parameter is assumed to be hex data in full byte format (2 characters per byte required). If this parameter is in hex format, you may use commas on any byte boundary to separate input data. For example,

```
P  0  'This is the beginning of the file'
P  EE-1  90,90,909090
```

S   This command places a stamp or ID at the end of a COM or EXE file. It is designed to help track the updates and sequence in which they were applied for a particular program. The only parameter is 5 bytes of ID for the update. This update ID is appended to the end of the COM or EXE file with other control information when executed.

Note: The Update program will enforce the rule of only appending a stamp to COM or EXE files.

For example:

```
S    PRT01
S    PATIZ
```

V   This command verifies part of the file that is to be updated. Its first parameter is the hex address to start the verify relative to the beginning of the file. This address may have simple hex addition and subtraction within it. Hex values are right-justified. This feature is useful for handling relative addresses within a file.

The second parameter is the data used to verify. If this parameter starts with a single quote, the rest of the data is considered a character string and is terminated by another single quote. Otherwise, the parameter is assumed to be hex data in full byte format (two characters per byte required). If the parameter is in hex format, you may use commas on any byte boundary to separate input data. For example:

```
V    10+2A-C  'DUMMY STRING'
V    100+1a   CF,FA,534678,90,90,DC5C
```

The following is an example of a control data set:

```
C  THIS IS THE BEGINNING OF THE
C  UPDATE CONTROL DATA SET EXAMPLE
B
V  0   '123'
C  IF THE VERIFY AT ADDRESS 0 FAILS
C  THEN THE FOLLOWING UPDATE AND STAMP
C  WILL NOT OCCUR
P  0   '234'
S  10001

B
V  0   '234'
C  IF THE VERIFY AT ADDRESS 0 PASSES
C  THEN THE FOLLOWING UPDATE AND STAMP
C  WILL OCCUR
P  0   '123'
S  10002
C  END OF THE EXAMPLE
```

Updating with the Update Program

Use the following procedure to update the Emulation Program.

1. The Update Program will be run from the DOS prompt.

   Change to the emulation directory, if necessary. At the DOS
   prompt, type **EMPATCH** and press ENTER. The 5250 Emu-
   lation Update Utility menu appears.

   Note: If your system unit does not have a fixed disk, you
   will need to copy the files EMPATCH.COM and
   EMPANA.MRI from program diskette 2 (3.5 inch) or
   program diskette 3 (5.25 inch) to your working
   diskette.

2. Select option 1, Apply an Update to a 5250 Emulation File, to
   update the Emulation Program. (Option 2 is explained
   below.)

   The 5250 Emulation Update application screen appears.
   This screen prompts you to enter the file to be updated and
   the file with the update information.

3. Type the file name to be updated and press TAB.

4. Enter the file name of the control data set and press ENTER.

As the Update program applies updates to the program, a list of update stamps appears on the screen. The reverse image status line at the bottom of the screen will indicate any error condition or completion of the update process.

Listing Applied Updates

The Update program also allows you to view a list of all updates that have been made to a file.

1. Select option 2 from the 5250 Emulation Update Utility screen. The program prompts you to enter the file name.

2. Type the filename and press ENTER. A list of all updates applied to the file appears in this format:

   FIXsssssyyyymmdd

   where:

   sssss = the stamp specified by an **S** command

   yyyy mm dd = the date of the option.

Glossary

access. A way or means of approach to a part or to data.

acronym. A word formed from the initial letter or letters of each of the successive parts or major parts of a compound term.

adapter. The part of a device or feature required to attach it to a processing unit.

address. The number assigned to a device or to a location in memory.

alarm. See *beep*.

align. To bring into or be in line with another or with others. For example, to line up the numbers on the decimal point.

allocate. To assign a resource, such as a fixed disk file or a diskette file, to perform a specific task.

alphabetic. Of, relating to, or employing an alphabet.

alphabetic keys. The letter keys a through z, blank, comma, period, and hyphen.

alphameric. (1) Consisting of both letters and numbers and often other symbols (such as punctuation marks and mathematic symbols). (2) Capable of using alphameric characters.

alternative. A choice between two or more things to be chosen.

alternative shift mode. A method of operation that causes keys to be entered as characters or functions (for example, the Backspace key is represented as the clear function when the Alt key is held down). See also *nonshifted mode* and *shifted mode*.

Alt state. The definition for the key when you press that key and an Alt key at the same time.

application program. A program used to perform a particular data processing task such as payroll.

ASCII. American Standard Code for Information Interchange. The standard code using a coded character set consisting of 7-bit coded characters (8 bits including parity check), used for information interchange among data processing systems, data communications systems, and associated equipment. The ASCII set consists of control characters and graphic characters.

aspect ratio. The ratio of the width of the data to its height as displayed on a monitor or display.

asterisk. The character * used in printing or writing as a reference mark.

async. See *asynchronous*.

asynchronous. Not happening, existing, or arising at precisely the same time.

attribute. The properties associated with the use of a device.

authorize. To allow a user to communicate with or make use of an object, resource, or function.

auto-configuration. The automatic arrangement of the parts of a computer.

AUTOEXEC.BAT file. A batch file that contains DOS commands or program names that are executed immediately after DOS is started.

back up. To copy information, usually onto a diskette for safe-keeping.

backspace. To move back a position along a row.

batch file. A file containing one or more commands that DOS executes one at a time. All batch files must have the extension of .BAT.

beep. An audible tone at a display or printer that is used to get the operator's attention.

binary. Pertaining to a numbering system with a base of 2. Valid digits are 0 (zero) and 1 (one).

bit. The basic unit of computer information, such as 0 or 1.

block cursor. See *cursor*.

boot. Loading and executing the boot record. This is accomplished by pressing and holding the **CTRL** and **ALT** keys and then pressing the **DEL** key.

boot record. A record stored on track 0 and sector 0 of a disk(ette) which contains a program designed to load the Disk Operating System into memory and start its execution.

boundary. The division between each of 64K blocks of physical storage addresses.

buffer. A temporary storage unit that accepts data at one rate and delivers it at another rate.

bypass. To avoid by means of another path.

byte. The amount of storage required to represent one character; a byte is 8 bits.

cable splice. The physical connection between two pieces of twinaxial cable.

Cable Thru feature. A special feature that allows more than one display station (except the 5251 Model 2 or 12) and/or more than one printer to be attached to a single cable path.

capacity. The ability to receive, hold, or store.

card. An adapter card that is installed in the system unit to enable it to be connected to another device or to increase the size of the computer's memory.

caret. The wedge shaped mark made on written or printed matter to indicate the place where a character is to be inserted.

character codes. The ASCII or EBCDIC values assigned to the symbols or functions that are used by the system unit or in the IBM 5250 Information Display System.

character set. A set or style of alphabetic, numeric, and special characters that can be displayed or printed by the system unit or a device in the IBM 5250 Information Display System.

checklist. Any list in which items can be compared, scheduled, verified, or identified.

clicker. A mechanism that sounds when a key is pressed and accepted for processing.

close a file. To remove a file from the program in which it is executing. Contrast with *open a file*.

column. The character position within a print line or on a display. The positions are numbered from 1, by 1 starting at the leftmost character position and extending to the rightmost position.

column separators. The character symbol displayed at the beginning and end of each column in an input field.

combination. A result of bringing two or more things together.

command line. (1) A DOS command and any associated parameters, file names, etc. (2) The line on the display screen following the DOS prompt where you type a DOS command.

compatible. The ability of one device to work with another without the need to change either device.

CONFIG.SYS. A personal computer file that contains the device driver assignments.

configuration. The group of machines, devices, and programs that make up a data processing system.

configure. To connect the devices, work stations, programming, and the host system to each other by using addresses.

contention. The contest of two or more rivals trying to reach the same goal at the same time.

control panel. A panel that contains lights (to observe the status) and switches (to operate) on a device or a system.

controller. A device used to coordinate and control the operation of one or more devices.

coordinate. To put things in order.

copyright. The exclusive right to reproduce, publish, and sell the matter and form of a material.

CPI. Characters per inch.

current directory. The root directory or the last directory indicated to DOS by a CHDIR (Change Directory) command.

current screen size. The number of rows and columns of data which are displayed on the screen.

cursor. A movable marker (such as an underline or a block) on the display used to indicate to the operator where to type the next character.

cursor location. The location on the screen (row 1 through 24 and column 1 through 80), at which the cursor is located.

D connector. A D-shaped connector like the connector on the cable that connects the Integrated Cable Assembly to the system unit.

data. All information entered into or used by the computer.

data stream. The sequence of characters being transmitted over a line.

deallocate. To free memory or disk(ette) space from use with a specific task.

default value. A value stored in the system that is used when no other value is specified.

deflector. The person or object that changes the course of travel.

delete. To remove, for example, to erase a file.

determination. The act of making or arriving at a decision.

device. The generic term for a piece of equipment or a mechanism; for example, the Personal Computer display or the Personal Computer attached printer.

device address. The unique number assigned to a device that enables it to communicate with other devices in a system.

device driver. A program used to control the operation of an output device.

device type. The number assigned to a unit or box in a system, such as 5150 (the IBM Personal Computer system unit).

diagnostic. Pertaining to the investigation of the cause of an error.

diagram. A line drawing made to show the location of objects.

digit. Any of the numbers from 0 through 9.

directory. A list of files contained on a disk(ette).

disable. To prevent a unit of a data processing system from operating with the rest of the system.

disclosure. The act of exposing to view.

disk. A round flat plate coated with a magnetic substance on which data from a computer is stored.

diskette. A thin, flexible magnetic plate that is permanently sealed in a protective cover.

diskette drive. The electromechanical device which records and reads the information that is stored on a diskette.

display screen. The part of a display station on which information is displayed.

display station. (1) A device that includes a keyboard from which an operator can send information to the system and a display screen on which an operator can see the information sent to or the information received from the system. (2) See also *work station*.

DOS. Disk Operating System. A program that works with the processing unit and the disk or diskette drive to control the flow of data.

DOS session. The method of operation which allows the PS/2 or personal computer to perform independently of the host system when attached as an emulated work station.

DP5250. The controlling program of the Enhanced 5250 Emulation Program. This program allows use of one or two display sessions or one display session and one printer session.

dual session. Ability of one system unit to perform as two work stations without signing off one to use the other.

EBCDIC. (1) An acronym for the Extended Binary-Coded Decimal Interchange Code. A set of 256 eight-bit characters. (2) A set of standards for data transmission.

emulate. To imitate a device with a second device so that the host system accepts the same data and is able to get the same results with the data from either device.

emulated control panel. The screen used on the system unit to imitate the control panel of the IBM 5256, 5219, or 5224 printer.

emulation. The use of a device or program that emulates another device or program.

emulation mode. The mode of operation in which the system unit is operated like a work station in an IBM 5250 Information Display System.

Emulation Program. A program which allows you to imitate an IBM 5250 work station and uses the functions of a host system.

emulator. A program or device that performs the functions of another program or device.

engineering change. The alteration to a product that allows it to perform either additional functions or to correctly perform its designed functions.

engineering change level. The manufacturing level of a product.

error code. A hexadecimal value that identifies a condition that interferes with normal operations.

error message. A displayed indication that an error has been detected.

escape sequence. A combination of keystrokes used to send commands to a printer.

execution. The process of carrying out the instructions of a computer program by a computer.

expansion unit. The box that provides space for additional options to be attached to the system unit.

facility. Something that is built, installed, or established to serve a particular purpose.

field. One or more characters of information (such as a name or an amount).

field exit. To move the cursor from a numeric field on the display screen.

field exit required. A rule that requires either a field exit key, a cursor movement key, or a nondata key be used to move the cursor from a numeric field.

file. A collection of records of information that you create, group, and access by file name.

file name. The name assigned to a file.

file specification. Any DOS file name including the drive and path.

fixed address vector. A pointer in the 5250 Emulation Program that points from fixed addresses to internal addresses that can change.

fixed disk. A disk of rigid material with a magnetic coating used for mass storage of data.

font. An assortment of type all of one size and style.

format. (1) (noun) The specific arrangement of information. (2) (verb) To arrange information in a specific way.

formatted screen. A screen with fields established for specific information.

free key mode. An operating mode that allows the entering of data without control by a system program (unformatted).

function keys. (1) Personal Computer keys F1 through F10, whose functions are assigned by the operating system or application program. (2) A keyboard key that requests an action but does not display a character. The cursor movement keys are examples of function keys.

function control keys. See *function keys*.

generic. Relating to or characteristic of an entire group or class.

graphics. See *graphics-capable*.

graphics-capable. The ability to display or print complicated drawings.

hardware. The equipment that makes up a data processing system. Contrast with *software*.

help text. A display aid that provides the operator with an explanation of a message that has been received or that allows an operator to request information on how to use a key, menu, or parameter.

hex. See *hexadecimal*.

hexadecimal. A numbering system with a base of 16. Valid digits range from 0 (zero) through 9 (nine) and A (ten) through F (fifteen).

home position. (1) The first input position of the first input field on the screen of a display station. (2) The position (far left) to which the print head moves after the printer has been turned on, after the Stop switch has been pressed.

host system. (1) The System/36, System/38, or the AS/400. (2) The primary or controlling system in a data communications configuration.

hot key sequence. A keying sequence that allows you to change sessions.

id. Identification.

IEEE. Institute of Electrical and Electronic Engineers

II. Input inhibited. The input inhibited indicator used in the Enhanced 5250 Emulation Program.

IM. See *insert mode*.

inadvertent. By mistake, unintentional.

incur. Become responsible for.

inhibited. Prevented from doing something.

initialize. To prepare for use. For example, to format a diskette and to initialize registers, and/or program variables to the condition previously determined by a program.

initiate. To cause something to start.

input. Data to be processed.

input field. An area on the screen in which an operator enters data. Input fields are blank on the screen and can have a prompt before the input field.

insert mode. The mode of operation that allows characters to be placed between the characters already displayed on the screen when a character key is pressed. Characters are inserted at the location identified by the cursor.

installation. The act of installing, the state of being installed.

Integrated Cable Assembly. A cable that connects the Enhanced Display Station Emulation Adapter to the work station line. This cable

automatically terminates the line when a second line is not connected.

integrity. The state of not being changed or erased.

intend. Have in mind a purpose or goal.

intensity. The level of brightness used to display the characters on the screen.

intention. A determination to act in a certain way.

interact. To act upon one another.

interface. The machinery and programs that permit the exchange of information between computers or devices.

interrupt level. A path used to get the processing unit's immediate attention.

I/O. Input/output.

I/O address. See *device address*.

justify. To adjust text to be even with the left and right margins.

KB. Keystroke buffering. The display indicator used to show the operator when keystrokes are saved.

K-byte. Kilobyte. 1024 bytes of information.

keyboard layout. The arrangement of the keys on the keyboard attached to a display station.

keyboard template. See *template*.

keystroke. The act of pressing a key on a keyboard.

keyword. A symbol that identifies a parameter.

KS. Keyboard shift. The display indicator used to show the operator when the keyboard is in the shifted mode.

line. The cable from the host computer or controller to which one or more work stations are attached.

load. To move data or programs into memory.

local display station. See *local work station*.

local work station. A work station that is attached directly to the host system with twinaxial cable.

lowercase mode. The keyboard is in lowercase mode when the Shift keys are not pressed and the shift lock and caps lock functions are unlocked.

LPI. Lines per inch.

M-byte. Megabyte. 1,048,576 bytes of information.

make/break key. A key that sends a scan code to the host system when it is pressed and again when it is released.

matrix. Characters arranged in rows and columns.

maximum. The largest number in a group of numbers.

memory. The devices used to store data within a computer.

minimum. The smallest number in a group of numbers.

mode. A method of operation.

modem. A device that allows information to be exchanged between computers using telephone lines.

monitor. The device that is used to display information that is viewed by a computer operator.

monochrome. Made with a single color.

MW. Message waiting. The display indicator used to show the operator when a message received from the host is waiting to be displayed.

nonshifted mode. A method of operation that causes keys to be entered as characters or functions similar to when a typewriter's shift key is not held down (for example, the **a** is represented as **a**). See also *alternative mode* and *shifted mode*.

normal image. The display attribute that causes characters to be displayed as light characters on a dark background.

null character. A blank (no character) that is displayed as a result of zeros occupying a character position in the buffer.

numeric. Refers to any of the numbers 0 through 9.

numeric keys. The characters 0 through 9, blank, comma, period, plus, and minus.

on-card memory. The memory contained on the Enhanced Display Station Emulation Adapter.

offline. The state of not being controlled by, or directly communicating with, a host system.

online. The state of being controlled by, or directly communicating with, a host system.

open a file. To associate a file with a program. Contrast with *close a file*.

operating system. A program that supervises the execution of user programs by the computer.

overlay. (1) To write over (and therefore destroy) an existing file. (2) A program segment that is loaded into storage and replaces all or part of a previously loaded program segment.

override. To use in place of another.

panel. A screen display listing options or requesting action.

parallel printer. A printer that uses the parallel printer interface feature.

parameter. A value supplied to a program that is used as input or controls the actions of the program.

password. A code you must enter before you can access specific programs.

path. The sequence of directories designated for DOS to search when looking for a program.

personal computer mode. The method of operation which allows the PS/2 or personal computer to perform independently of the host system when attached as an emulated 5250 work station.

physical planning. The action taken to prepare a site for the installation of a computer or some related equipment.

pixel. An element of a picture.

playback sequence. A combination of characters and/or functions assigned to a key.

plotter. An output device that graphically records data in two dimensions (length and width) on paper.

port. (1) The part of the system unit or controller to which cables for work stations are attached. (2) The part of the Integrated Cable Assembly to which the work station line may be connected.

print buffer. A storage area within the printer where characters to be printed are temporarily stored.

print head. The part of the printer that strikes the ribbon to print characters on the paper forms.

printer. A device that provides printed output.

printwheel. The element used to create the impressions printed by the IBM Wheelprinter (Model 5216).

processing unit. The part of a computer that operates on data.

profile. (1) Data file that describes the features of a user, program, or device. (2) A table of attributes containing session numbers, device types, keyboard selections, mode selection, I/O address assignments, on-card address assignments, and an interrupt level.

program. A sequence of instructions for a computer.

program diskette. A diskette which contains programs to be executed on the system unit, for example, the Enhanced 5250 Emulation Program Licensed Program Diskette.

prompt. A displayed request for information or operator action.

protocol. A series of rules for transferring data.

PS/2 mode. See *personal computer mode*.

purpose. Something set up as an end or a goal to be reached.

recovery procedure. The action performed by the operator when an error message appears on the display screen.

remote display station. See *remote work station*.

remote work station. A work station that is attached directly or indirectly to the host system via some communication channel.

remotely. Indirectly or from a distance.

reset. See *system reset*.

resolution. The visual quality of the display.

restart. To start again.

reverse image. A method of highlighting where the character color on the screen and the background color are swapped. For example, in place of green on black, the characters would appear as black on green.

right adjust. To position a character to the rightmost position of the field.

root directory. The directory on a disk(ette) that contains the list of files stored on that disk(ette). If there is more than one directory on the disk(ette), the root directory can also contain the names of each of the other directories. This directory is established when the disk(ette) is formatted.

row. The horizontal arrangement of characters on a screen.

SA. System available. The system available indicator is used with the Enhanced 5250 Emulation Program.

scan code. A numeric representation of a key's location on a keyboard.

screen. A display, similar to a television screen, used to display characters.

SCS. SNA (system network architecture) control string.

self-loading program. A program that does not use the Disk Operating System to move from a diskette to PS/2 or personal computer memory.

separator. See *column separator*.

serial printer. A printer that uses the serial printer interface feature.

session. (1) The period of time in which the host system and one of the devices are communicating. (2) The logical connection between the host system and a work station. The session may be established for a display station or for a printer.

setup. To prepare an object to be used.

shifted mode. A method of operation that causes keys to be entered as a character or function similar to when a typewriter's shift key is held down (for example, an **a** represented as **A**). See also *alternative mode* and *nonshifted mode*.

sign on (verb). To begin a session at a display station.

sign-on (noun). The action an operator uses at a display station in

order to begin working at the display station.

sign-on screen. The screen that prompts the user to enter the appropriate sign-on command.

signal. To notify.

signed numeric. A format control used to specify that the units position of the field is reserved for the sign (usually, blank for positive and minus for negative).

signed numeric field. A numeric field that has a character in it to identify it as having either a positive or negative value.

simulate. To make to look real.

simultaneous. At the same time.

software. The programs, procedures, and rules that are stored as data but are used to control the operation of a computer. Contrast with *hardware*.

software reset sequence. A keying sequence that allows you to leave 5250 emulation mode and take the emulated work station offline.

splice. To join by weaving (as two ropes) or by connecting two objects.

spool. To place in a queue.

station address. See *work station address*.

station address list. A list of work station addresses a session may use.

station protector. A device connected to the twinaxial cable to protect a work station against lightning.

status. A condition, for example, the status of a personal computer, a printer, or a job.

status line. The 25th (or bottom) row on the screen of the system unit, which is used to display the condition of the session.

subsystem. A system that operates under control of another system.

symbol keys. The keys on the keyboard that represent displayable characters other than alphabetic and numeric characters.

synchronous. A type of data communications protocol that transmits data according to a precisely timed clock pulse.

syntax. The rules for the construction of a statement.

system. A computer, its devices, and programs.

system operator. A person who uses a display station, which is designated as the system device to activate certain system functions and control and monitor system operation.

system reset. The pressing and holding of the Alt and Ctrl keys, then the pressing of the Del key. This causes the boot record to be read into memory and given control.

system time. The time of day as recognized by a system.

system unit. (1) An IBM PS/2, models 25, 30, 30 286, the IBM Personal Typing System, the IBM Personal Computer, IBM Personal Computer XT, IBM Personal Computer XT 286, IBM Portable Personal Computer, or IBM Personal Computer AT, which is used with the Enhanced 5250 Emulation Program. (2) The part of the PS/2 or personal computer that contains the processing unit.

table. A list of data in which each item can be uniquely identified.

template. A pattern to help the user identify the location of keys on a keyboard.

terminate. Brought to an end.

terminator. The person or thing that causes something to end.

terminator switch. A switch used to terminate the line at the last work station when the Cable Thru feature is used.

toggle. To operate a device (switch) that stays in the operated position until operated a second time.

trademark. A device (as a word) that identifies an owner of a machine, program, or book.

twinaxial cable. A cable made of two wires inside a shield.

unassigned. Not assigned.

underscore. To draw a line under.

unique. The only one.

unrecognizable. Not recognizable, not able to be recognized.

unusable. Not usable, cannot be used.

update. To modify.

uppercase. Capital letters.

uppercase mode. The method of operation that causes alphabetic characters to be displayed as capital letters and all other keys in the typewriter area, when pressed, to be displayed as the character shown on the upper portion of these keys.

utility. A program in general support of the processes of a computer; for example, a sort program.

VDI. Virtual device interface

withdraw. (1) To remove. (2) To no longer make available.

work station. An input/output device consisting of a display station and/or printer that allows you to send and receive information from a host system.

work station address. The address assigned to a work station which enables the host system to communicate with it.

work station line. The twinaxial cable from a host computer or the

chain of work stations to which a work station is connected.

working diskette. The program diskette, which contains all the programs necessary to perform one or more tasks, and which is used routinely.

4-digit. Consisting of four digits or numbers.

5250 profile. A table of attributes containing session numbers, device types, keyboard selection, mode selection, I/O address assignments, on-card address assignments, and an interrupt level.

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